TRC Environmental Corporation

EMISSIONS TESTING OF A PRESS REGENERATIVE THERMAL OXIDIZER

Presented to

Louisiana-Pacific Corporation
Houlton, Maine

Prepared by

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TRC Project No. 19624
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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was retained by Louisiana-Pacific Corporation to conduct an emissions measurement program on the regenerative thermal oxidizer (RTO) at the Louisiana-Pacific facility in New Limerick, Maine. The purpose of this program was to measure emissions of formaldehyde, oxides of nitrogen (NO_x), and carbon monoxide (CO) at the inlet and outlet of the RTO. Emissions measurements for NO_x, and CO were conducted in accordance with accepted USEPA test methodologies. Formaldehyde testing was conducted using the NCASI Acetylacetone Method for measuring formaldehyde in water.

The test program was conducted on December 14, 1995 and was supervised by Mr. Raul Baez of TRC. Ms. Sue Somers and Mr. Mark Stile, both of Louisiana-Pacific, provided the process and logistical support during the program.

Section 2.0 of this test report presents a summary and discussion of the test results. Section 3.0 describes the process and associated control equipment and the parameters that were monitored during testing. Section 4.0 details the test methods to be used, and Section 5.0 presents TRC's quality control plan for this program.

2.0 SUMMARY AND DISCUSSION OF RESULTS

The purpose of this program was to measure emissions of formaldehyde, oxides of nitrogen (NO_x), and carbon monoxide (CO) at the inlet and outlet of the regenerative thermal oxidizer (RTO). Emissions measurements for NO_x, and CO were conducted in accordance with accepted USEPA test methodologies. Formaldehyde testing was conducted using the NCASI Acetylacetone Method for measuring formaldehyde in water. The following sections provide the results for each pollutant.

2.1 Regenerative Thermal Oxidizer Emissions

Emissions measurements were conducted at the inlet and outlet of the regenerative thermal oxidizer (RTO) to determine inlet and outlet concentrations of formaldehyde, NO_x, and CO. Triplicate 60-minute formaldehyde tests were conducted at each location in accordance with the NCASI Acetylacetone Method for measurement of formaldehyde in water. Triplicate 20-minute NO_x and CO tests were conducted at each location in accordance with EPA Methods 7E and 10, respectively. In addition, TRC measured the volumetric flowrate, concentration of oxygen, and moisture content of the exhaust gases at each location in accordance with EPA Methods 1-4. The results of the inlet and outlet tests are presented in **Tables 2-1 and 2-2**, respectively. All associated field data are presented in **Appendix A**.

2.1.1 Formaldehyde Emissions

The results of the formaldehyde testing indicate that the average inlet concentration was 6.6 parts per million (ppm) and that the average inlet loading rate was 2.25 lb/hr. The average outlet concentration was 0.3 ppm and the average outlet emission rate was 0.10 lb/hr. The average removal efficiency of formaldehyde was 95.5 %.

2.1.2 NO_x and CO Emissions

The results of the continuous emissions monitoring for NO_x and CO at the inlet of the RTO indicate that the average NO_x concentration was 1.6 ppm and the average inlet loading rate was 0.83 lb/hr. The average CO concentration was 9.8 ppm and the average inlet loading rate was 3.10 lb/hr.

Table 2-1

Summary of Formaldehyde, NOx, and CO Loading at the RTO Inlet

Louisiana-Pacific Corporation
New Limerick, Maine
December 14, 1995

Test Number Time Location	In-1 1035-1135 RTO -Inlet	In-2 1200-1300 RTO -Inlet	In-3 1338-1438 RTO -Inlet	Average
Stack Conditions				
Stack Temperature (°F)	102	104	104	103
CO_2 (%)	0.00	0.00	0.00	0.00
O_2 (%)	20.8	20.9	20.8	20.8
Moisture (%)	1.33	1.37	1.40	1.36
Volumetric Flowrate, Actual (ACFM)	78432	79065	79364	78954
Volumetric Flowrate, Standard (SCFM)a	73109	73420	73688	73406
Volumetric Flowrate, Dry Std. (DSCFM)b	72137	72415	72660	72404
Formaldehyde Emissions				
Concentration (ppm)	5.9	6.5	7.6	6.6
Mass Emission Rate (lb/hr)c	1.98	2.20	2.57	2.25
NOx Emissions				
Concentration (ppm)	1.8	2.1	0.9	1.6
Mass Emission Rate (lb/hr)c	0.93	1.09	0.47	0.83
CO Emissions				
Concentration (ppm)	16.3	7.1	6.1	9.8
Mass Emission Rate (lb/hr)c	5.13	2.24	1.93	3.10

a - ACFM Actual Cubic Feet per Minute.
b - DSCFM Dry Standard Cubic Feet per Minute at 68°F and 29.92 in. Hg.
c - lb/hr = conc(ppm) x MW x flow(DSCFM) x 15.58E-08
MW Formaldehyde = 30
MW NOx = 46
MW CO = 28

Table 2-2

Summary of Formaldehyde, NOx, and CO Emissions at the RTO Outlet

Louisiana-Pacific Corporation
New Limerick, Maine
December 14, 1995

Test Number Time Location	out-1 1035-1135 RTO-outlet	out-2 1200-1300 RTO-outlet	out-3 1338-1438 RTO-outlet	Average
Stack Conditions				
Stack Temperature (°F)	232	234	235	233
CO_2 (%)	0.00	0.00	0.00	0.00
O_2 (%)	20.3	20.4	20.4	20.4
Moisture (%)	2.11	2.04	2.42	2.19
Volumetric Flowrate, Actual (ACFM)	95318	94835	96425	95526
Volumetric Flowrate, Standard (SCFM)[a]	72896	72370	73477	72914
Volumetric Flowrate, Dry Std. (DSCFM)[b]	71357	70891	71700	71316
Formaldehyde Emissions				
Concentration (ppm)	0.3	0.3	0.3	0.3
Mass Emission Rate (lb/hr)[c]	0.10	0.10	0.11	0.10
NOx Emissions				
Concentration (ppm)	15.9	16.0	15.6	15.8
Mass Emission Rate (lb/hr)[c]	8.13	8.13	8.02	8.09
CO Emissions				
Concentration (ppm)	16.5	15.8	16.6	16.3
Mass Emission Rate (lb/hr)[c]	5.14	4.89	5.19	5.07

a - ACFM Actual Cubic Feet per Minute.
b - DSCFM Dry Standard Cubic Feet per Minute at 68_oF and 29.92 in. Hg.
c - lb/hr = conc(ppm) x MW x flow(DSCFM) x 15.58E-08
MW Formaldehyde = 30
MW NOx = 46
MW CO = 28

The results of the continuous emissions monitoring for NO_x and CO at the outlet of the RTO indicate that the average NO_x concentration was 15.8 ppm and the average emission rate was 8.09 lb/hr. The average CO concentration was 16.3 ppm and the average inlet loading rate was 5.07 lb/hr.

2.1.3 Volumetric Flowrate

Volumetric flowrate measurements were conducted at the inlet and outlet of the RTO in accordance with EPA Method 2. The results indicated that the inlet flowrate was approximately 1000 DSCFM greater than the outlet flowrate. However, the outlet flowrate should have been greater than the inlet flowrate due to the addition of combustion air. This error can be partially explained by the accuracy of the EPA Method 2. EPA Method 2 has an accuracy of +/- 10%. It is possible that the inlet measurement was biased high and the outlet may have been biased low.

3.0 PROCESS DESCRIPTION

The Houlton, Maine facility operates one oriented strandboard line including two wafer dryers, a press, and two thermal oil heaters.

3.1 Regenerative Thermal Oxidizer

The regenerative thermal oxidizer (RTO) is used to control emissions of volatile organic compounds and particulate matter from the press operation. The RTO is fired on natural gas. During testing the plant operated at approximately 90% of the daily production rate of 440 tons per day. Plant personnel monitored and recorded the following data:

Panels/Hour
Panel Weight
Press Temp.
Tons/Hour

Copies of the recorded process data are presented in **Appendix C**.

4.0 SAMPLING AND ANALYTICAL METHODS

Emissions measurements were conducted at the inlet and outlet of the RTO in accordance with the following methods.

4.1 NO_x and CO Emissions Measurements - EPA Methods 7E and 10

Triplicate 20-minute tests were conducted at the inlet and outlet of the RTO to measure concentrations of NO_x and CO. Testing was conducted in accordance with EPA Methods 7E and 10, respectively. Diluent concentrations of oxygen were measured in accordance with EPA Method 3A. A schematic of the measurement system is presented in **Figure 4-1.** A single CEMS was used to evaluate inlet and outlet concentrations. A three way valve was placed in line prior to the conditioning system, which allowed the operator to switch from the inlet to the outlet location and vice versa. Each sampling location had a dedicated sampling probe and heated sample line prior to the three way valve and conditioning system.

All CEM data was recorded by a Yokogawa Model 2300 strip chart/data logger which is capable of integrating 5-minute and 20-minute averages. The CEM system was housed in the TRC Mobile Environmental Laboratory (MEL) which was parked at the base of the RTO.

4.1.1 Sample Conditioning System

An in-stack Alundum thimble filter with a stainless steel nozzle facing away from the stack gas flow was used to remove any PM from the sample gas stream. The thimble filter was mounted on the end of a stainless steel sampling probe. The sample was then drawn through 100 feet of heated (325°F ± 25°F) Teflon sample line through a condenser system to remove the moisture from the gas stream. The sample was drawn through the tubing by a leak-free Teflon double-diaphragm pump to a stainless steel sample manifold with an atmospheric bypass rotameter. The analyzers then drew their samples from the manifold.

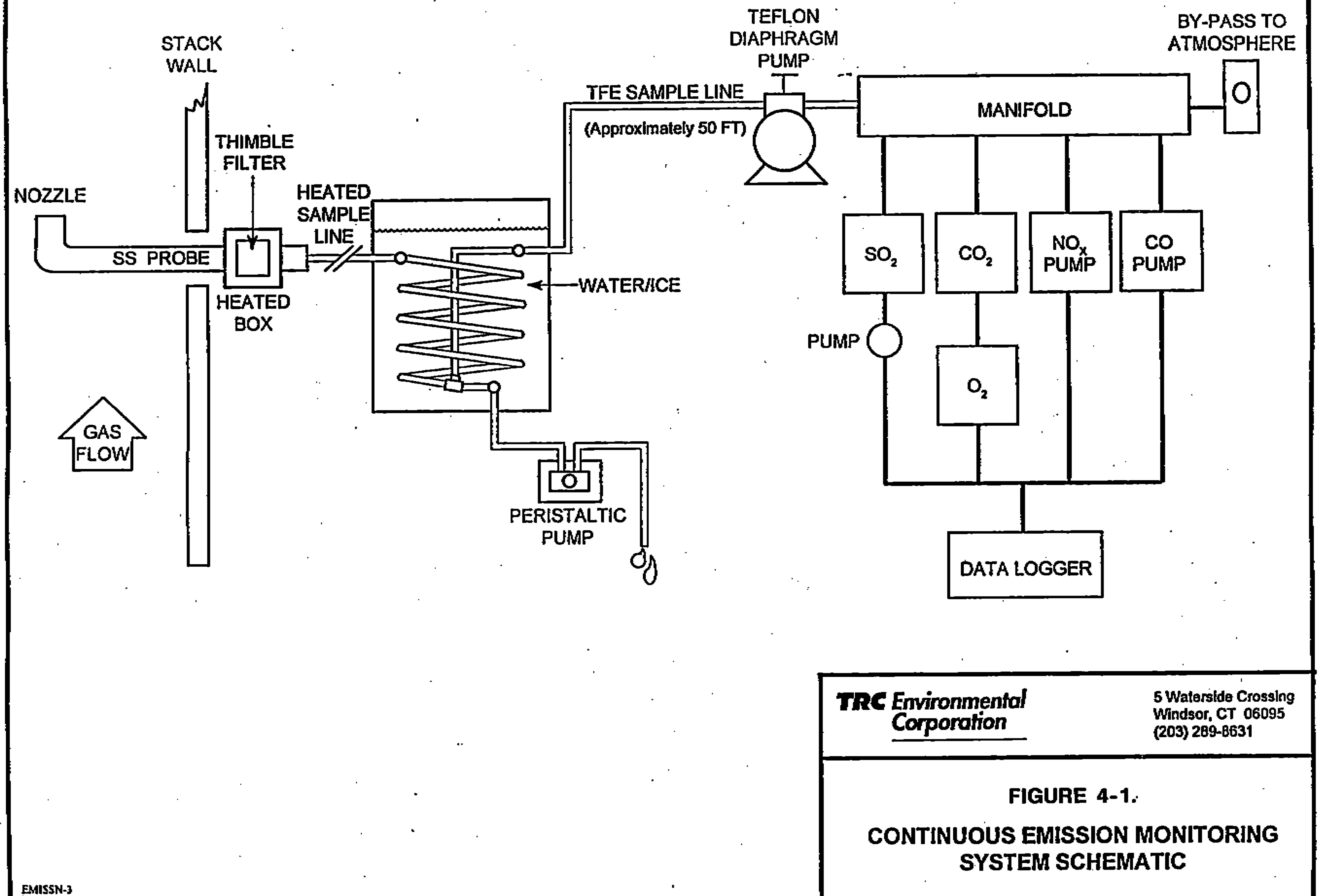

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FIGURE 4-1.

CONTINUOUS EMISSION MONITORING SYSTEM SCHEMATIC

4.1.2 NO_x Analyzer

A Thermo-Electron Corporation Model 10A Chemiluminescent NO/NO_x analyzer was used to determine NO_x concentrations. The chemiluminescent reaction of NO and O_3 (ozone) provides the basis for the analytical method ($NO + O_3 \rightarrow NO_2 + O_2$ + light). A photomultiplier-electrometer-amplifier produces a current proportional to the NO concentration. The output of the amplifier provides a signal for direct readout on a meter indicator, or for outputs to a recorder or computer.

4.1.3 CO Analyzer

A TECO Model 48 nondispersive infrared gas analyzer was used to measure CO concentrations. The analyzer contains an infrared detector that uses the signal nondispersive beam technique with alternate modulations of the sample and reference cells. Radiation absorbed by CO in the sample cell results in a capacitance change in the detector which is proportional to the CO concentration.

4.1.4 O_2 Analyzer

A Horiba Model PMA-200 O_2 analyzer was used to determine the concentration of O_2 in the stack gas. This instrument uses the paramagnetic principle, whereby the magnetic susceptibility of the gas volume is measured by the force acting on a nonmagnetic test body suspended in a magnetic field. The force is converted to an output current proportional to the O_2 concentration.

4.1.5 Data Acquisition and Handling

All CEM data was monitored by a Yokagawa Model 2400 automatic data logger. Emissions data was "viewed" by the data logger every six seconds, averaged, and printed at 5-minute intervals and 20-minute intervals.

4.1.6 CEM Calibrations

Calibrations (zero, low, mid, and high of span) of each analyzer were performed using EPA Protocol 1 gases at the beginning and end of each test period. Calibration gases were introduced to the system through a three-way valve at the back of the sample probe. The gas concentrations used were approximately 30%, 60%, and 90% of each analyzer's range. Each analyzer was multi-point calibrated at the beginning of the test program to establish linearity of each instrument.

4.2 Formaldehyde Measurements - NCASI Method

Triplicate 60-minute tests were conducted at the inlet and outlet of the RTO to measure concentrations of formaldehyde. Testing was conducted in accordance with the NCASI Acetylacetone Method (Determination of Formaldehyde in Water), with inlet and outlet testing conducted simultaneously. The sampling system describe in the NCASI method was modified by TRC. TRC's modification was to use a standard EPA Method 5 train with standard impingers instead of mini-impingers. This modification allowed for more accurate measurement of sample volume and the use of heated probes and filters.

4.2.1 Sample Collection

Formaldehyde sampling was accomplished by use of an EPA Method 5 train. The sample train is shown schematically in **Figure 4-2** and consisted of a nozzle, probe, filter, four impingers, a vacuum pump, dry-gas meter, and an orifice flow meter.

A stainless steel nozzle was attached to a glass-lined stainless steel probe which was heated to prevent condensation. Teflon mat filter papers supported in 4½-inch glass filter holders were used to remove particulate matter from the gas stream. The filter assembly was enclosed in a heated box to maintain temperatures at 248°F ± 25°F. A thermocouple located inside the back half of the filter holder monitored the gas stream temperature and verified that the temperature was kept at 248°F ± 25°F.

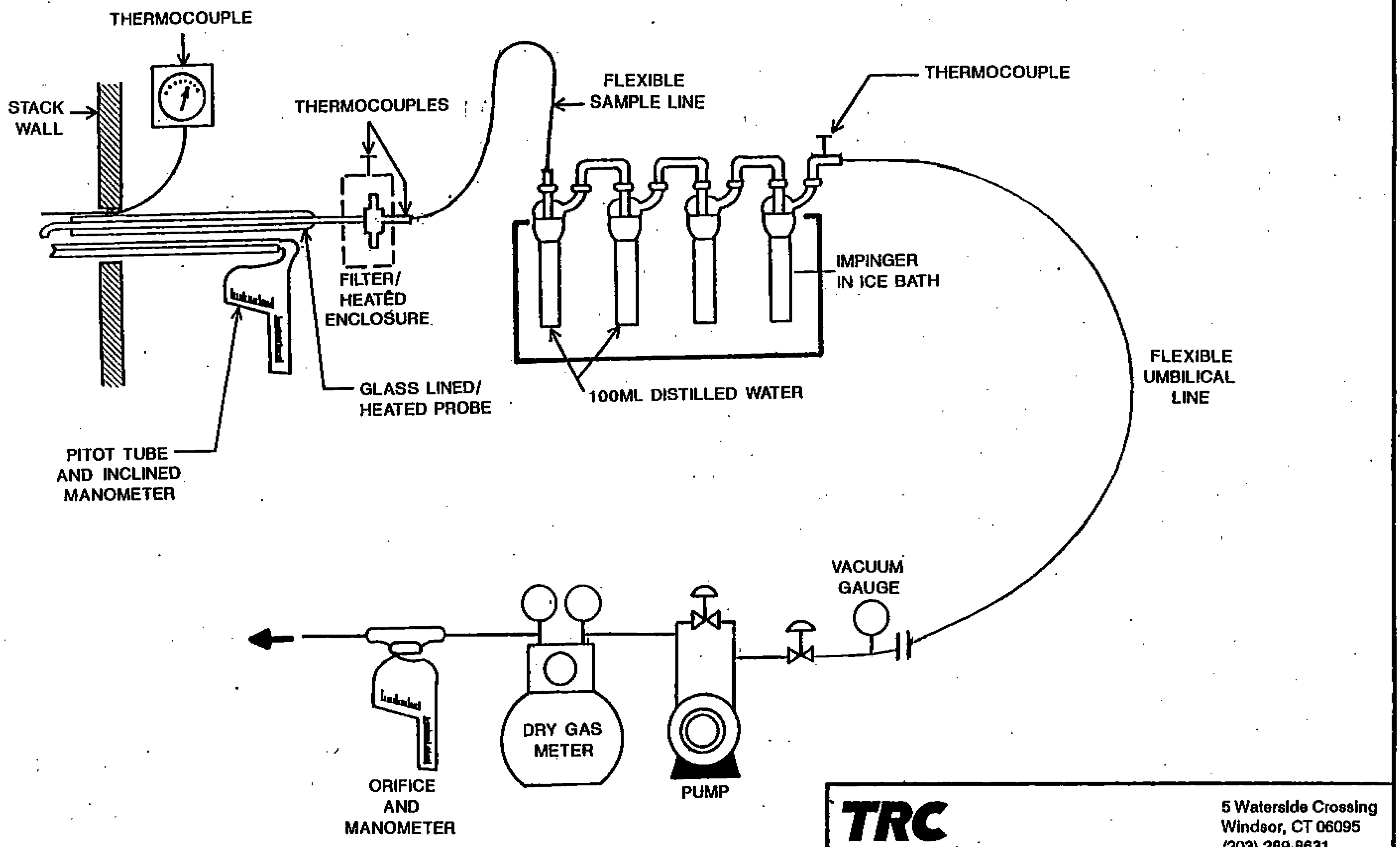

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Figure 4-2

NCASI Formaldehyde Train

An ice bath containing four impingers was attached to the back end of the filter. The first and second impingers contained 100 milliliters (mℓ) each of HPLC grade deionized water. The third impinger was empty, and the fourth impinger contained silica gel to remove any remaining moisture. Flexible tubing, a vacuum gauge, a needle valve, a leakless vacuum pump, a bypass valve, a dry-gas meter calibration orifice, and an inclined manometer completed the sampling train. The stack velocity pressure and temperature were monitored by an S-type pitot and a thermocouple connected to a potentiometer. A check valve was not used in the TRC sampling train.

Sampling flow was adjusted by means of the bypass valve. Before and after each particulate test run, the sampling train was leak checked to meet the 0.02 cfm limit. All pertinent test data were recorded on the appropriate field data sheets.

4.2.2 Sample Recovery

Two sample containers were used, as follows:

Container No. 1: The impinger contents were measured volumetrically to the nearest milliliter.and deposited into a sample jar. Each impinger was rinsed three times with HPLC grade deionized water. The water rinses were also deposited into the sample jar.

Container No. 2: Silica gel from the fourth impinger was transferred to its original container and weighed to the nearest 0.5 milligram (mg).

4.2.3 Sample Analysis

The samples were transported to TRC's laboratory, where the following analyses were performed:

Container No. 1: The impinger contents were analyzed in accordance with the NCASI Acetylacetone Method.

Container No. 2: Silica gel was weighed to the nearest 0.5 mg. The weight of the moisture entrapped in the silica gel, along with the impingers, was used to calculate the moisture content of the stack gas.

4.3 Flowrate and Moisture Measurements

Flowrate measurements were conducted according to EPA Method 2. An S-type pitot and an inclined manometer were used to measure the velocity pressure head, and a thermocouple was used to monitor gas stream temperature.

4.4 Sampling Locations

Sampling points for isokinetic and/or flowrate measurements at each location were determined in accordance with EPA Method 1.

4.4.1 Regenerative Thermal Oxidizer Inlet and Outlet

Inlet sampling was conducted from two ports in the 54-inch diameter stack. The ports were located 2.8 diameters downstream from any flow disturbances and 5.4 diameters upstream from any flow disturbances. Twenty four traverse points were sampled with each flowrate measurement. The inlet sampling point locations are presented in **Figure 4-3.**

Outlet sampling was conducted from two ports in the 76-inch diameter stack. The ports were located 10.4 diameters downstream from any flow disturbances and 6.9 diameters upstream from the stack exhaust. Twelve traverse points were sampled with each flowrate measurement. The outlet sampling point locations are presented in **Figure 4-4.**

Figure 4-3

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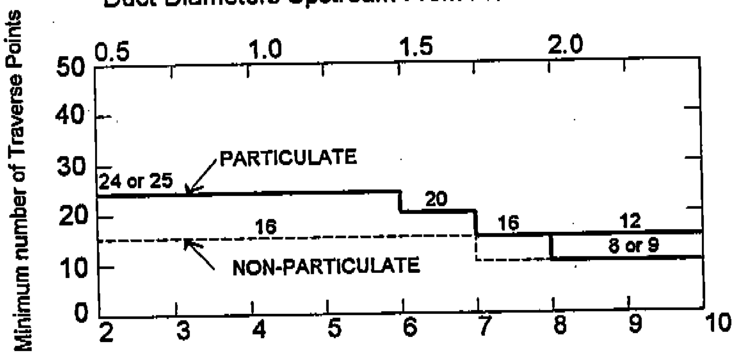
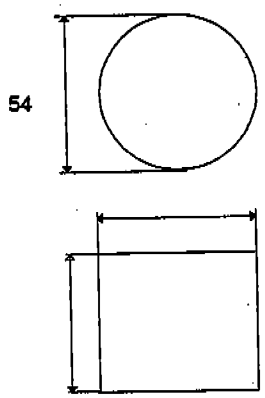
EPA Method 1 Data Sheet

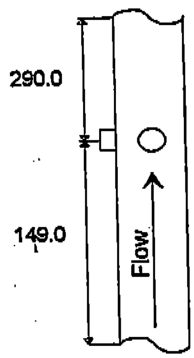
Firm	Louisiana-Pacific
Location	RTO Inlet
Diameters Upstream	5.4
Diameters Downstream	2.8
Nipple Size (in.)	6

Total Traverse Points Required	24
Number of Ports	2
Points Per Port	12
Traverse (Horizontal or Vertical)	Horizontal/Vertical

Minimum Number of Traverse Points For Particulate and Non-Particulate Traverses







Cross-Sectional Layout For Rectangular Stacks	
Total Traverse Points	Matrix
9	3x3
12	4x3
16	4x4
20	5x4
25	5x5

Location of Points on a Circular Stack

Point Number On a Diameter	(Percent of Stack Diameter from Inside Wall to Traverse Point) No. of Traverse Points on a Diameter) 4	8	10	12
1	6.7	3.2	2.6	2.1
2	25.0	10.5	8.2	6.7
3	75.0	19.4	14.6	11.8
4	93.3	32.3	22.6	17.7
5		67.7	34.2	25.0
6		80.6	65.8	35.6
7		89.5	77.4	64.4
8		96.8	85.4	75.0
9			91.8	82.3
10			97.4	88.2
11				93.3
12				97.9

Traverse Point Location

Point Number	Distance From Wall	Total Distance
1	1.1	7.1
2	3.6	9.6
3	6.4	12.4
4	9.6	15.6
5	13.5	19.5
6	19.2	25.2
7	34.8	40.8
8	40.5	46.5
9	44.4	50.4
10	47.6	53.6
11	50.4	56.4
12	52.9	58.9

Figure 4-4

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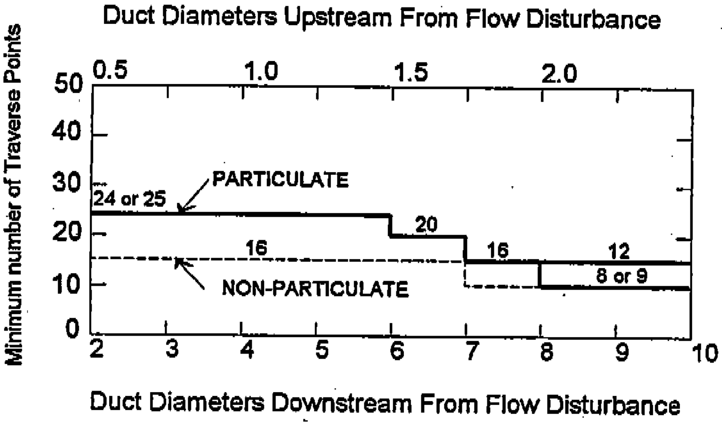
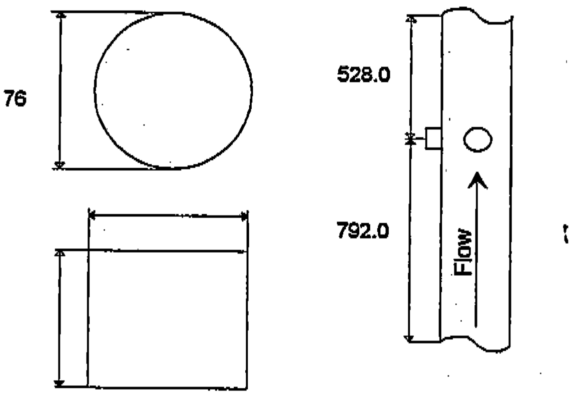
EPA Method 1 Data Sheet

Firm	Louisiana-Pacific
Location	RTO Outlet
Diameters Upstream	6.9
Diameters Downstream	10.4
Nipple Size (in.)	6

Total Traverse Points Required	12
Number of Ports	2
Points Per Port	6
Traverse (Horizontal or Vertical)	Horizontal

Minimum Number of Traverse Points For Particulate and Non-Particulate Traverses





Cross-Sectional Layout For Rectangular Stacks	
Total Traverse Points	Matrix
9	3x3
12	4x3
16	4x4
20	5x4
25	5x5

Location of Points on a Circular Stack

Point Number On a Diameter	(Percent of Stack Diameter from Inside Wall to Traverse Point) No. of Traverse Points on a Diameter) 4	8	10	12
1	6.7	3.2	2.6	2.1
2	25.0	10.5	8.2	6.7
3	75.0	19.4	14.6	11.8
4	93.3	32.3	22.6	17.7
5		67.7	34.2	25.0
6		80.6	65.8	35.6
7		89.5	77.4	64.4
8		96.8	85.4	75.0
9			91.8	82.3
10			97.4	88.2
11				93.3
12				97.9

Traverse Point Location

Point Number	Distance From Wall	Total Distance
1	3.3	9.3
2	11.1	17.1
3	22.5	28.5
4	53.5	59.5
5	64.9	70.9
6	72.7	78.7
7		
8		
9		
10		
11		
12		

5.2 Analytical Quality Control

Compressed gases used as fuels and carriers were purchased at specific purities, according to application. Compressed gases used as calibration standards are always National Institute for Standards and Technology (NIST) traceable, either directly or indirectly.

In the TRC and subcontract laboratories, all QC samples including field blank samples, reagent and filter blanks, and any audit samples were analyzed with the actual test samples. Each laboratory maintains a continuous QC program to monitor instrument response and analyst proficiency and to ensure the precision and accuracy of all analytical results. These programs were developed in consultation with EPA, NIOSH, and various state departments of health.

TRC used some or all of the following quality control procedures during the field and laboratory sampling program:

> *Field Blanks*—For each set of samples taken, a field blank was also be collected. Field blanks included filter materials and solutions used for sample collection and recovery.
>
> *Replicates*—When the analytical procedure permitted, a prescribed number of the analyses were duplicated to indicate the precision of the method used.

Appendix A

Field Data

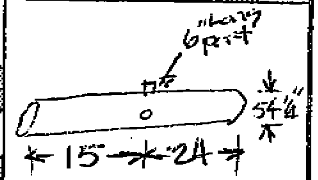
ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE
L.P. Houlton ME	inlet		in#1	12-14-95

OPERATORS	Barometric (in Hg)	Static P. (in H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
S.B RB	30.02	-4.5	15		54 1/2	.84	NA	NA	NA

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
OK	80823	1.88	1.00	2	C-7			[illegible]2	.002	3	.000	NA

Notes:



POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H2O)	ΔH Orifice (in H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	10:35	0	11.000		1.88	100	240	235	25	NA	33	30	3	
		5	14.700		1.88	100	244	240	24		36	31	3	
		10	18.300		1.88	100	242	245	30		38	32	3	
		15	23.900		1.88	100	244	246	34		39	33	3	
		20	25.600		1.88	100	238	250	36		43	34	3	
		25	29.200		1.88	100	240	254	38		45	36	3	
		30	32.800		1.88	100	235	255	40		47	37	3	
		35	36.300		1.88	100	230	255	40		48	38	3	
		40	39.800		1.88	100	235	257	40		49	39	3	
		45	43.300		1.88	100	235	257	42		49	40	3	
		50	46.900		1.88	100	230	258	45		49	40	3	
		55	50.300		1.88	100	230	257	48		49	41	3	
STOP	11:35	60	53.663											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
60	42.663			

Ave. DGM Temp.
40

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Inlet		In # 2	12/14/95	Formaldehyde

OPERATORS	Barometric (in Hg)	Static P. (in H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
Gouko/Baez	30.02	-4.5	10		54	0.84	5/8 TEFLON"/MANTLE	NA	NA

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
OK	P0823	1.88	1.00	2	C-7			10	0.001	5	0.000	NA

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H2O)	ΔH Orifice (in H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	12:00	0	53.800		1.88	100	225	230	36	NA	39	38	3	NA
		5	57.400		1.88	100	225	230	35		39	38	3	
		10	60.900		1.88	100	236	240	35		41	37	3	
		15	64.400		1.88	100	236	240	36		42	37	3	
		30	67.900		1.88	100	240	238	40		44	37	3	
		35	71.400		1.88	100	240	237	40		44	37	3	
		30	74.800		1.88	100	242	243	39		45	37	3	
		35	77.200		1.88	100	240	247	39		46	38	3	
		40	81.600		1.88	100	238	252	38		46	38	3	
		45	85.100		1.88	100	236	254	37		46	38	3	
		50	88.500		1.88	100	248	256	37		47	39	3	
		55	91.900		188	100	249	257	37		47	39	3	
STOP	13:00	60	95.312											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
60	41.512			

Ave. DGM Temp.
41

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
L.D. Houlton ME.	Inlet		In# 3	12/4/95	

OPERATORS		Barometric (in Hg)	Static P. (in H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzle Number	Nozzle Diameter
Boyko	BAEZ	29.99	-4.5	10		54	.84	5' teflon / Mantle	NA	NA

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
ok	80823	1.88	1.00	2	C-7			10	.001	3	000	NA

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H2O)	ΔH Orifice (in H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
	13:38	0	95.400		1.88	100	236	240	35	NA	35	35	3	NA
		5	99.200		1.88	100	238	241	39	↓	36	35	3	↓
		10	102.900		1.88	100	242	241	40		38	35	3	
		15	106.600		1.88	100	241	239	43		40	35	3	
		20	110.300		1.88	100	242	244	45		42	35	3	
		25	114.000		1.88	100	238	248	47		43	35	3	
		30	117.700		1.88	100	240	251	48		44	36	3	
		35	121.800		1.88	100	239	256	50		45	36	3	
		40	125.000		1.88	100	238	257	50		45	36	3	
		45	128.500		1.88	100	236	259	52		46	37	3	
		50	132.100		1.88	100	241	260	53		46	37	3	
		55	135.700		1.88	100	238	262	54	↓	46	37	3	↓
STOP	14:38	60	139.067											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
	43.667			

Ave. DGM Temp.
39

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Outlet - Press		1-out	12/13/95	Formaldehyde

OPERATORS	Barometric (in Hg)	Static P. (in H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
R. Baker/Bivio	30.02	-0.42	15	—	77				

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
	50136	1.75	1.00					0.001	8	0.000	5	

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H2O)	ΔH Orifice (in H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM In (°F)	DGM Out (°F)	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	1035	0	742.953		1.75	230	240	245	32		41	38	5	
	1040	5	746.091		↓	236	250	250	33		41	38	5	
	1045	10	749.46			236	250	250	34		41	38	5	
	1050	15	752.41			236	250	250	36		41	38	5	
	1055	20	754.41			236	250	250	38		43	39	5	
	1100	25	759.62			236	250	250	39		48	41	5	
	1105	30	763.19			236	250	250	40		50	42	5	
	1110	35	766.69			236	250	250	41		51	43	5	
	1115	40	770.32			236	251	242	42		53	45	5	
	1120	45	774.07			236	251	237	45		53	45	5	
	1125	50	777.36			236	251	237	48		53	46	5	
	1130	55	780.84			236	250	239	51		53	46	5	
	1135	60	784.300											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
	41.347			

Ave. DGM Temp.
44

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Outlet		2	12/14/93	

OPERATORS	Barometric (in Hg)	Static P. (in H20)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
Bael / Bourg	30.02	-0.42	10		77	0.99	1/2 heated teflon		

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
	80836	1.75	1.0	5				10	0.000	5	0.000	

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H20)	ΔH Orifice (in H20)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	1200	0	784.45		1.75	230	240	233	33		46	45	3	
	1205	5	788.31		1.75	230	246	238	33		46	45	3	
	1210	10	791.65		1.71	230	246	235	33		46	43	3	
	1215	15	795.40		1.75	230	244	240	33		49	44	3	
	1220	20	798.30		1.75	230	244	243	33		49	45	3	
	1225	25	801.72		1.75	230	250	242	34		50	45	3	
	1230	30	805.22		1.75	230	250	243	37		51	45	3	
	1235	35	808.77		1.75	230	250	242	38		51	45	3	
	1240	40	812.30		1.75	230	249	242	40		52	46	3	
	1245	45	815.81		1.75	230	249	242	40		52	46	3	
	1250	50	819.42		1.75	230	250	243	43		52	46	3	
	1255	55	823.0		1.75	230	250	242	45		52	46	3	
	1300	60	827.45											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
	43.00				47

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Lousiana Pacific	Outlet		#3	12/14/95	Formaldehyde

OPERATORS	Barometric (in Hg)	Static P. (in H20)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
Craez/Bowen	29.44	-0.42	10		77	0.84			

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (in Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
✓	8836	1.77	1.0	3				0.001	10	5	0.000	

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H20)	ΔH Orifice (in H20)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	1338	0	826.600		1.75	230	215	200	29		44	43	2	
	1343	5	830.10		1.75	230	245	238	32		44	43	2	
	1348	10	833.45		1.75	230	249	240	34		44	43	2	
	1353	15	836.89		1.75	230	249	242	35		45	43	2	
	1358	20	840.23		1.75	230	250	242	36		47	43	2	
	1403	25	843.68		1.75	230	250	240	38		47	43	2	
	1408	30	847.07		1.75	230	250	243	40		48	43	2	
	1413	35	850.46		1.75	230	250	242	43		49	43	2	
	1418	40	853.93		1.75	230	251	242	43		50	43	2	
	1423	45	857.45		1.75	230	250	243	48		50	44	2	
	1428	50	860.96		1.75	230	250	242	50		51	44	2	
	1433	55	864.51		1.75	230	250	245	50		52	45	2	
	1438	60	868.044											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
	41.444			

Ave. DGM Temp.
45

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EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 12-14-95 9 30AM
LOCATION Press - Inlet - stack
STACK DIMENSIONS 54.5" AREA ____ ft^2
BAROMETRIC PRESSURE, Pb = 30.04 in. Hg
STACK STATIC PRESSURE, Pg = ± - 4.5 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w 28.9
STACK GAS MOISTURE CONTENT, % H_2O = 10%
PITOT NO. ____ Cp= 0.99
TESTER ____

SCHEMATIC OF TRAVERSE POINT LOCATION
Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	Ts (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P}$ · COS θ
A	1	1.5		90			
	2	1.7		100			
	3	1.9		100			
	4	2.0		100			
	5	2.2		105			
	6	2.2		105			
	7	2.3		105			
	8	2.4		105			
B	1	1.3		100			
	2	1.4		102			
	3	2.2		100			
	4	2.2		100			
	5	1.9		100			
	6	1.9		100			
	7	1.8		100			
	8	1.7		103			
		Average	2.756	T_s = 101°F	*		
				T_{sr} = 561 °R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460°$ 29.709

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = ~~30.01~~

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot \cos\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ~~159.16~~ 79.98 ft/sec 159.47

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ~~3259~~ 32729 ACFM 16780

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528°R}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ~~30464~~ 15003 DSCFM

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EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 12-14-95 1200
LOCATION Inlet
STACK DIMENSIONS 54.5 AREA ____ ft^2
BAROMETRIC PRESSURE, Pb = 30.01 in. Hg
STACK STATIC PRESSURE, Pg = ± -4.6 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w 25.9
STACK GAS MOISTURE CONTENT, % H_2O = ____
PITOT NO. ____ Cp= 0.84
TESTER ____

SCHEMATIC OF TRAVERSE POINT LOCATION

Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	Ts (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P}$ · COS θ
A	1	1.6		100			
	2	1.7		100			
	3	1.9		100			
	4	2.1		100			
	5	2.2		105			
	6	2.2		102			
	7	2.3		106			
	8	2.4		107			
B	1	1.4		100			
	2	1.4		100			
	3	2.2		102			
	4	2.2		103			
	5	1.9		104			
	6	1.9		105			
	7	1.8		107			
	8	1.7		104			
		Average	1.385	T_s = 103°F	*		
				T_{sr} = 563°R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^o$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = 29.70

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot COS\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = 80.57 ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = 16562 ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^oR}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = 15053 DSCFM

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TRC
EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 121491   1300
LOCATION Inlet
STACK DIMENSIONS 545 AREA ______ ft^2
BAROMETRIC PRESSURE, Pb = 30.01 in. Hg
STACK STATIC PRESSURE, Pg = ± -4.7 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w 28.9
STACK GAS MOISTURE CONTENT, % H_2O = ______
PITOT NO. ______ Cp= 0.84
TESTER ______

SCHEMATIC OF TRAVERSE POINT LOCATION
Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P}$ · COS θ
A	1	1.6		100			
	2	1.7		100			
	3	1.8		102			
	4	1.7		103			
	5	2.2		102			
	6	2.2		105			
	7	2.3		105			
	8	2.4		106			
B	9	1.5		107			
	2	1.5		108			
	3	2.2		109			
	4	2.2		108			
	5	2.2		106			
	6	1.9		108			
	7	1.9		108			
	8	1.8		108			
		Average		T_s = °F	*		
				T_{sr} = °R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^0$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = ______

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P}\cdot COS\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ______ ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ______ ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^oR}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ______ DSCFM

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EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 121495
LOCATION Inlet 1400
STACK DIMENSIONS ________ AREA ________ ft^2
BAROMETRIC PRESSURE, Pb = ________ in. Hg
STACK STATIC PRESSURE, Pg = ± ________ in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w ________
STACK GAS MOISTURE CONTENT, % H_2O = ________
PITOT NO. ________ Cp= ________
TESTER ________

SCHEMATIC OF TRAVERSE POINT LOCATION
Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P} \cdot \cos\theta$
	1	1.6		100			
	2	1.8		101			
	3	1.9		102			
	4	1.8		103			
	5	1.9		104			
	6	2.0		105			
	7	2.1		105			
	8	2.2		105			
	1	1.6		100			
	2	2.15		101			
	3	2.3		103			
	4	2.3		104			
	5	2.2		104			
	6	2.0		105			
	7	1.7		105			
	8	1.7		105			
		Average		T_s = °F	*		
				T_{sr} = °R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^o$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = ________

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot \cos\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ________ ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ________ ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^oR}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ________ DSCFM

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EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 12-14-95 1000
LOCATION OUTLET
STACK DIMENSIONS 77 1/4 AREA ____ ft^2
BAROMETRIC PRESSURE, Pb = 30.02 in. Hg
STACK STATIC PRESSURE, Pg = ± -0.42 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w ____
STACK GAS MOISTURE CONTENT, % H_2O = ____
PITOT NO. ____ Cp= 0.49
TESTER ____

SCHEMATIC OF TRAVERSE POINT LOCATION
Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P} \cdot \cos\theta$
A	1	0.46		226			
	2	0.55		233			
	3	0.55		233			
	4	0.60		234			
B	5	0.60		236			
	6	0.60		236			
	7	0.61		236			
	8	0.65		236			
	1	0.42		[illegible]			
	2	0.45		[illegible]			
	3	0.57		226			
	4	0.59		226			
	5	[illegible]		234			
	6	0.62		235			
	7	0.67		233			
	8	0.65		233			
		Average	1.518	T_s = 232°F	*		
				T_{sr} = 692°R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^0$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = 30.01

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot \cos\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ~~47.77~~ 48.69 ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ~~14943~~ 9971 ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^0R}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ~~1511~~ 7555 DSCFM

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EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 121495 1200
LOCATION Outlet
STACK DIMENSIONS 77 1/4 AREA ____ ft^2
BAROMETRIC PRESSURE, Pb = 30.02 in. Hg
STACK STATIC PRESSURE, Pg = ± -0.42 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w 28.9
STACK GAS MOISTURE CONTENT, % H_2O = 10
PITOT NO. ____ Cp= 0.99
TESTER ____

SCHEMATIC OF TRAVERSE POINT LOCATION
Cyclonic Flow Angle + θ Clockwise
- θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P}$ · COS θ
A	1	0.46		230			
	2	0.55		231			
	3	0.55		232			
	4	0.60		230			
	5	0.60		231			
	6	0.61		235			
	7	0.61		236			
	8	0.65		237			
B	1	0.42		230			
	2	0.93		231			
	3	0.48		232			
	4	0.57		234			
	5	0.59		235			
	6	0.61		235			
	7	0.67		235			
	8	0.66		235			
		Average		T_s = °F	*		
				T_{sr} = °R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^0$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = 30.01

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot \cos\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = 48.25 ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = 9,882 ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^oR}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = 7513 DSCFM

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TRC
EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LF
DATE 121495 1300
LOCATION OUTLET
STACK DIMENSIONS 77 1/4 AREA ______ ft^2
BAROMETRIC PRESSURE, Pb = 30.02 in. Hg
STACK STATIC PRESSURE, Pg = ± -0.42 in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w 28.9
STACK GAS MOISTURE CONTENT, % H_2O = 10
PITOT NO. ______ Cp= 0.84
TESTER ______

SCHEMATIC OF TRAVERSE POINT LOCATION

Cyclonic Flow Angle + θ Clockwise, - θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P}$ · COS θ
A	1	0.47		230			
	2	0.54		231			
	3	0.54		231			
	4	0.59		231			
	5	0.60		231			
	6	0.61		232			
	7	0.62		233			
	8	0.65		233			
B	1	0.42		233			
	2	0.49		236			
	3	0.49		236			
	4	0.56		236			
	5	0.60		236			
	6	0.61		237			
	7	0.66		237			
	8	0.66		235			
		Average		T_s = °F	*		
				T_{sr} = °R	*Avg. of absolute values including zeroes		

Absolute Gas Temperature, $T_{sr} = T_s + 460^o$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = ______

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot COS\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ______ ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ______ ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^oR}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ______ DSCFM

Rev. 3 3/22/82

TRC Environmental Consultants, Inc.

TRC
EPA METHOD 2
VELOCITY TRAVERSE AND FLOWRATE DETERMINATION

PAGE ____ OF ____

PLANT LP
DATE 121495
LOCATION outlet 1400
STACK DIMENSIONS ________ AREA ________ ft^2
BAROMETRIC PRESSURE, Pb = ________ in. Hg
STACK STATIC PRESSURE, Pg = ± ________ in. H_2O
STACK GAS MOLECULAR WEIGHT (Wet), M_w ________
STACK GAS MOISTURE CONTENT, % H_2O = ________
PITOT NO. ________ Cp= ________
TESTER ________

SCHEMATIC OF TRAVERSE POINT LOCATION

Cyclonic Flow Angle + θ Clockwise - θ Counterclockwise

PORT	POINT	ΔP Inch H_2O	$\sqrt{\Delta P}$	T_s (°F)	± θ	Pitots reversed for Negative Flow?	$\sqrt{\Delta P} \cdot \cos\theta$
	1	0.45		232			
	2	0.47		230			
	3	0.66		230			
	4	0.66		233			
	5	0.67		230			
	6	0.67		233			
	7	0.67		237			
	8	0.7		230			
	9	0.60		232			
	2	0.52		232			
	3	0.63		246			
	4	0.69		241			
	5	0.66		241			
	6	0.62		241			
	7	0.59		241			
	8	0.60		241			
	Average			T_s = °F	*		
				T_{sr} = °R			

*Avg. of absolute values including zeroes

Absolute Gas Temperature, $T_{sr} = T_s + 460^0$

Absolute Gas Pressure, $P_s = P_b + P_g/13.6$ = ________

Gas Velocity, $V_s = (85.49)\ C_p\ (\sqrt{\Delta P} \cdot \cos\theta)\ avg \sqrt{\frac{T_{sr}\ avg}{P_s\ M_w}}$ = ________ ft/sec

Actual Gas Flowrate, $Q_a = (V_s)(60)(A)$ = ________ ACFM

Standard Gas Flowrate, $Q_{std} = Q_a \left(\frac{528^0R}{T_{sr}}\right)\left(\frac{P_s}{29.92}\right)\left(\frac{100 - \%\ H_2O}{100}\right)$ = ________ DSCFM

Imp - weight

T-1	Inlet	Outlet
Before	3171	3187
after	3184 / 13	3207 / 20

T-2	Inlet	Outlet
Before	3126	3185
after	3139 / 13	3205 / 20

T-3	Inlet	Outlet
Before	3109	3113
after	3123 / 14	3136 / 23

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific
Location	Houlton, ME
Tester	S. Paterson
Test No.	Inlet-1
Sample Loc.	RTO Inlet Duct
Date	December 14, 1995
TIME	1035-1055

Ambient Temp, deg. F =	10
MEL Temp, deg. F =	70
Bar. Pressure, in Hg =	30.28
Vacuum Gauge =	10
Pressure Gauge =	
% Moisture =	

	Calibration Gases			
	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2				
CO	142	451	ALM010642	AAL 20965
SO_2	--			
NOx	49.5	88.6	ALM43797	ALM43127
THC				

		Calibration Data							Emissions Summary	
			Initial Values		Final Values					
		(Rack) Analyzer Cal. Response	System Cal. Response	System Cal. Bias % of Span	System Cal. Response	System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Measured Average Gas Conc.	Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.1	0.0	0.14	0.3	0.3	%	-	-
	Upscale	20.9	20.8	-0.6	20.78	-0.5	0.1	25	20.8	20.8
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.3	0.6	0.1	-5.5	-1.2	-1.2	ppm	-	-
	Upscale	451.8	448.3	-0.7	437.3	-2.9	-2.2	500	13.6	16.3
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	0.9	0.7	1.5	1.3	0.6	ppm	-	-
	Upscale	89.2	89.2	0.0	90.8	1.6	1.6	100	3.0	1.8
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.3	0.1	140.7	-0.3	451.8	0.2
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = **0.19**

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = **0.76**

K = 2.59E-09
MW for NOx = 46.01 g/gmol
Flow (dscfm)= 15,028
MW for CO= 20.00 g/gmol

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific
Location	Houlton, ME
Tester	S. Paterson
Test No.	Inlet-2
Sample Loc.	RTO Inlet Duct
Date	December 14, 1995
TIME	12:00 - 12:20

Ambient Temp, deg. F =	10
MEL Temp, deg. F =	70
Bar. Pressure, in Hg =	30.28
Vacuum Gauge =	10
Pressure Gauge =	
% Moisture =	

Calibration Gases	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2				
CO	142	451	ALM010642	AAL 20965
SO_2				
NOx	49.5	88.6	ALM43797	ALM43127
THC				

		Calibration Data: (Rack) Analyzer Cal. Response	Initial Values: System Cal. Response	Initial Values: System Cal. Bias % of Span	Final Values: System Cal. Response	Final Values: System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Emissions Summary: Measured Average Gas Conc.	Emissions Summary: Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.14	0.3	0.16	0.4	0.1	%	-	-
	Upscale	20.9	20.78	-0.5	20.73	-0.7	-0.2	25	20.8	20.9
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.3	-5.5	-1.2	-10.0	-2.1	-0.9	ppm	-	-
	Upscale	451.8	437.3	-2.9	431.4	-4.1	-1.2	500	-0.8	7.1
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	1.5	1.3	2.2	2.0	0.7	ppm	-	-
	Upscale	89.2	90.8	1.6	91.9	2.7	1.1	100	4.0	2.1
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.3	0.1	140.7	-0.3	451.8	0.2
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = **0.23**

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = **0.33**

K = 2.59E-09
MW for NOx = 46.01 g/gmol
Flow (dscfm)= 15,091
MW for CO= 20.00 g/gmol

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific	Ambient Temp, deg. F =	10
Location	Houlton, ME	MEL Temp, deg. F =	70
Tester	S. Paterson	Bar. Pressure, in Hg =	30.28
Test No.	Inlet-3	Vacuum Gauge =	10
Sample Loc.	RTO Inlet Duct	Pressure Gauge =	
Date	December 14, 1995	% Moisture =	
TIME	13:38 - 13:58		

	Calibration Gases			
	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2				
CO	142	451	ALM010642	AAL 20965
SO_2				
NOx	49.5	88.6	ALM43797	ALM43127
THC				

		Calibration Data	Initial Values		Final Values				Emissions Summary	
		(Rack) Analyzer Cal. Response	System Cal. Response	System Cal. Bias % of Span	System Cal. Response	System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Measured Average Gas Conc.	Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.2	0.4	0.13	0.3	-0.1	%	-	-
	Upscale	20.9	20.7	-0.7	20.68	-0.9	-0.2	25	20.7	20.8
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.3	1.4	0.2	-1.7	-0.4	-0.6	ppm	-	-
	Upscale	450.7	448.3	-0.5	442.3	-1.7	-1.2	500	5.9	6.1
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	2.2	2.0	2.2	2.0	0.0	ppm	-	-
	Upscale	89.2	91.9	2.7	91.8	2.6	-0.1	100	3.1	0.9
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = **0.10**

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = **0.29**

K = 2.59E-09
MW for NOx = 46.01 g/gmol
Flow (dscfm)= 15,143
MW for CO= 20.00 g/gmol

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.3	0.1	140.6	-0.3	450.7	-0.1
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific
Location	Houlton, ME
Tester	S. Paterson
Test No.	Outlet -1
Sample Loc.	RTO Stack
Date	December 14, 1995
TIME	1100 - 1120

Ambient Temp, deg. F =	10
MEL Temp, deg. F =	70
Bar. Pressure, in Hg =	30.28
Vacuum Gauge =	10
Pressure Gauge =	
% Moisture =	

	Calibration Gases			
	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2	--			
CO	142	451	ALM010642	AAL 20965
SO_2				
NOx	49.5	88.6	ALM43797	ALM43127
THC				

		Calibration Data	Initial Values		Final Values				Emissions Summary	
		(Rack) Analyzer Cal. Response	System Cal. Response	System Cal. Bias % of Span	System Cal. Response	System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Measured Average Gas Conc.	Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.1	0.3	0.18	0.5	0.2	%	-	-
	Upscale	20.9	20.7	-1.0	20.56	-1.4	-0.4	25	20.1	20.3
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.3	-0.2	-0.1	-4.2	-0.9	-0.8	ppm	-	-
	Upscale	451.8	443.8	-1.6	433.8	-3.6	-2.0	500	13.9	16.5
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	0.8	0.6	1.8	1.6	1.0	ppm	-	-
	Upscale	89.2	88.3	-0.9	89.8	0.6	1.5	100	17.0	15.9
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = 0.86

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = 0.39

K =	2.59E-09
MW for NOx =	46.01 g/gmol
Flow (dscfm)=	7,555
MW for CO=	20.00 g/gmol

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.3	0.1	140.7	-0.3	451.8	0.2
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific
Location	Houlton, ME
Tester	S. Paterson
Test No.	Outlet -2
Sample Loc.	RTO Stack
Date	December 14, 1995
TIME	12:25 - 12:45

Ambient Temp, deg. F =	10
MEL Temp, deg. F =	70
Bar. Pressure, in Hg =	30.28
Vacuum Gauge =	10
Pressure Gauge =	
% Moisture =	

Calibration Gases

	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2				
CO	142	451	ALM010642	AAL 20965
SO_2				
NOx	49.5	88.6	ALM43797	ALM43127
THC				

Calibration Data / Emissions Summary

		(Rack) Analyzer Cal. Response	Initial Values: System Cal. Response	Initial Values: System Cal. Bias % of Span	Final Values: System Cal. Response	Final Values: System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Measured Average Gas Conc.	Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.18	0.5	0.17	0.4	-0.0	%	-	-
	Upscale	20.9	20.56	-1.4	20.59	-1.3	0.1	25	20.2	20.4
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.3	-4.2	-0.9	-9.6	-2.0	-1.1	ppm	-	-
	Upscale	451.8	433.8	-3.6	425.7	-5.2	-1.6	500	8.4	15.8
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	1.8	1.6	2.3	2.1	0.5	ppm	-	-
	Upscale	89.2	89.8	0.6	90.2	1.0	0.4	100	17.9	16.0
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = **0.86**

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = **0.37**

K = 2.59E-09
MW for NOx = 46.01 g/gmol
Flow (dscfm)= 7,506
MW for CO= 20.00 g/gmol

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.3	0.1	140.7	-0.3	451.8	0.2
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

TRC Environmental Corporation
CEM Data Sheet

Firm	L Pacific	Ambient Temp, deg. F =	10
Location	Houlton, ME	MEL Temp, deg. F =	70
Tester	S. Paterson	Bar. Pressure, in Hg =	30.28
Test No.	Outlet -3	Vacuum Gauge =	10
Sample Loc.	RTO Stack	Pressure Gauge =	
Date	December 14, 1995	% Moisture =	
TIME	14:03 - 14:23		

	Calibration Gases			
	Mid Cal	High Cal	Tank ID Mid	Tank ID High
O_2	9.1	20.8	ALM037884	ALM057653
CO_2				
CO	142	451	ALM010642	AAL 20965
SO_2				
NOx	49.5	88.6	ALM43797	ALM43127
THC				

		Calibration Data							Emissions Summary	
			Initial Values		Final Values					
		(Rack) Analyzer Cal Response	System Cal Response	System Cal. Bias % of Span	System Cal Response	System Cal. Bias % of Span	Drift % of Span	Analyzer Units & Range	Measured Average Gas Conc.	Corrected Effluent Gas Conc.
O_2	Zero	0.1	0.2	0.4	0.18	0.5	0.0	%	-	-
	Upscale	20.9	20.6	-1.3	20.57	-1.4	-0.1	25	20.1	20.4
CO_2	Zero			0.0		0.0	0.0	%	-	-
	Upscale			0.0		0.0	0.0	20		ERR
CO	Zero	0.0	1.6	0.3	-0.2	-0.0	-0.4	ppm	-	-
	Upscale	450.7	447.5	-0.6	437.4	-2.7	-2.0	500	17.0	16.6
SO_2	Zero			0.0		0.0	0.0	ppm	-	-
	Upscale			0.0		0.0	0.0	1000		ERR
NOx	Zero	0.2	2.3	2.1	2.4	2.2	0.1	ppm	-	-
	Upscale	89.2	90.2	1.0	91.2	2.0	1.0	100	17.9	15.6
THC	Zero			0		0	0	ppm	-	-
	Upscale			0		0	0	100		ERR
			LIMITS	+/- 5%		+/- 5%	+/- 3%			

	ZERO Cal. Gas Analyzer Response	Analyzer Calib. Error	MID Cal. Gas Analyzer Response	Analyzer Calib. Error	HIGH Cal. Gas Analyzer Response	Analyzer Calib. Error
O_2	0.1	0.2	9.1	0.2	20.9	0.4
CO_2		0.0		0.0		0.0
CO	0.0	0.0	140.6	-0.3	450.7	-0.1
SO_2		0.0		0.0		0.0
NOx	0.2	0.2	47.6	-1.9	89.2	0.6
THC		0.0		0.0		0.0
	LIMIT	+/- 2%		+/- 2%		+/- 2%

Comments:
NOx (lb/hr) = K x ppm x MW x Flow

NOx (lb/hr) = **0.85**

CO (lb/hr) = K x ppm x MW x Flow

CO (lb/hr) = **0.39**

K = 2.59E-09
MW for NOx = 46.01 g/gmol
Flow (dscfm)= 7,615
MW for CO= 20.00 g/gmol

NOx 58PPM

MANUAL Dec. 14.95 08:10
O2 8.03% CO 1PPM NOx 484PPM ✓ O2 5mn 8.94%
CO 5mn 0PPM NOx 5mn 54PPM O2 20mn 8.40% CO 20mn 37PPM
NOx 20m 51PPM

NOx span

MANUAL Dec. 14.95 08:09
O2 8.00% ✓ CO 0PPM ✓ NOx -1PPM ✓ O2 5mn 1.75%
CO 5mn 0PPM NOx 5mn -2PPM O2 20mn 8.79% CO 20mn 39PPM
NOx 20m 42PPM

Zero

System cal Inlet

MANUAL Dec. 14.95 08:03
O2 8.04% CO 138PPM ✓ NOx -1PPM O2 5mn 4.01%
CO 5mn 85PPM NOx 5mn 98PPM O2 20mn 7.07% CO 20mn 48PPM
NOx 20m 96PPM

CO mid

0 10 20 30 40 50 60 70 80 90 100

MANUAL Dec. 14.95 08:02
O2 0.03% CO -2PPM NOx 242PPM ✓ O2 5mn 5.27%
CO 5mn 46PPM NOx 5mn 121PPM O2 20mn 7.39% CO 20mn 46PPM
NOx 20m 56PPM

NOx mid

MANUAL Dec. 14.95 08:01
O2 19.06% ✓ CO 73PPM NOx -2PPM O2 5mn 9.32%
CO 5mn 90PPM NOx 5mn -2PPM O2 20mn 7.68% CO 20mn 48PPM
NOx 20m 47PPM

O_2 mid

MANUAL Dec. 14.95 08:00
O2 0.00% CO 451PPM ✓ NOx -1PPM O2 5mn 0.38%
CO 5mn 96PPM NOx 5mn 12PPM O2 20mn 7.71% CO 20mn 34PPM
NOx 20m 50PPM

CO span

MANUAL Dec. 14.95 07:56
O2 0.08% CO 0PPM NOx 479PPM ✓ O2 5mn 0.09%
CO 5mn 0PPM NOx 5mn 461PPM O2 20mn 10.17% CO 20mn 5PPM
NOx 20m 56PPM

NOx span

MANUAL Dec. 14.95 07:54
O2 20.90% ✓ CO 0PPM NOx -2PPM O2 5mn 4.24%
CO 5mn 0PPM NOx 5mn -2PPM O2 20mn 11.10% CO 20mn 7PPM
NOx 20m -2PPM

O_2 span

MANUAL Dec. 14.95 07:51
O2 0.00% ✓ CO 0PPM ✓ NOx -2PPM ✓ O2 5mn 0.00%
CO 5mn 0PPM NOx 5mn -2PPM O2 20mn 7.85% CO 20mn 11PPM
NOx 20m -2PPM

Zero

Rack cal 12/14/95 L P Hoolton maine

MANUAL Dec. 13.95 19:16
O2 19.54% CO 67PPM NOx -3PPM O2 5mn 19.56%
CO 5mn 67PPM NOx 5mn 13PPM O2 20mn 19.53% CO 20mn 67PPM

8.39% NOx 5m Dec.14 09:46 5PPM O2

008:29 009:45 500mm/h

500 PPM

MANUAL Dec.14.95 08:29				
O2 0.14%	CO 442PPM	NOx 1PPM	O2 5m 9.95%	
CO 5m 30PPM	NOx 5m 449PPM	O2 20m 4.29%	CO 20m 245PPM	
NOx 20m 49PPM				
MANUAL Dec.14.95 08:27				
O2 20.80%	CO 0PPM	NOx 0PPM	O2 5m 7.21%	
CO 5m 1PPM	NOx 5m 302PPM	O2 20m 2.93%	CO 20m 257PPM	
NOx 20m 57PPM				
MANUAL Dec.14.95 08:26				
O2 0.11%	CO 1PPM	NOx 471PPM	O2 5m 0.13%	
CO 5m 2PPM	NOx 5m 468PPM	O2 20m 2.03%	CO 20m 292PPM	
NOx 20m 31PPM				

Dec.14 08:20

500 PPM

MANUAL Dec.14.95 08:24			
O2 0.10%	CO 2PPM	NOx -1PPM	O2 5m 2.42%
CO 5m 241PPM	NOx 5m -1PPM	O2 20m 0.94%	CO 20m 367PPM
NOx 20m -1PPM			

008:14 008:24 500mm/h

System Cal Correct

MANUAL Dec.14.95 08:14			
O2 0.00%	CO 440PPM	NOx 1PPM	O2 5m 2.62%
CO 5m 174PPM	NOx 5m 1PPM	O2 20m 8.72%	CO 20m 52PPM
NOx 20m 93PPM			

CO span

TRC ENVIRONMENTAL

25.00 %

MANUAL Dec.14.95 08:11			
O2 20.67%	CO -1PPM	NOx 0PPM	O2 5m 20.01%
CO 5m -1PPM	NOx 5m 5PPM	O2 20m 8.64%	CO 20m 35PPM
NOx 20m 58PPM			

O2 span

MANUAL Dec.14.95 08:10			
O2 0.03%	CO 1PPM	NOx 484PPM	O2 5m 8.94%
CO 5m 0PPM	NOx 5m 60PPM	O2 20m 8.40%	CO 20m 37PPM
NOx 20m 51PPM			

NOx span

MANUAL Dec.14.95 08:09

MANUAL Dec.14.95 09:59

O2	0.14%	CO	-13PPM	NOx	47.6PPM	O2 5mn	0.04%
CO 5mn	-13PPM	NOx 5mn	57PPM	O2 20mn	2.36%	CO 20mn	-10PPM
NOx 20mn	27PPM						

MANUAL Dec.14.95 09:58

O2	0.03%	CO	-13PPM	NOx	47.5PPM	O2 5mn	0.04%
CO 5mn	-12PPM	NOx 5mn	62PPM	O2 20mn	2.61%	CO 20mn	-10PPM
NOx 20mn	30PPM						

500 PPM

MANUAL Dec.14.95 09:56

0 10 20 30 40 50 60 70 80 90 100

O2	0.04%	CO	-12PPM	NOx	86.5PPM	O2 5mn	0.04%
CO 5mn	[illegible]	NOx 5mn	[illegible]	O2 20mn	3.08%	CO 20mn	-10PPM
NOx 20mn	34PPM						

5.97% NOx 5mn 5PPM

Dec.14 09:55

CO

o09:51 o09:55 500mm/h

MANUAL Dec.14.95 09:54

O2	0.03%	CO	-12PPM	NOx	0.0PPM	O2 5mn	7.67%
CO 5mn	-7PPM	NOx 5mn	6PPM	O2 20mn	3.70%	CO 20mn	-9PPM
NOx 20mn	40PPM						

Dec.14 09:50

CO

O2

500 PPM

MANUAL Dec.14.95 09:49

O2	0.04%	CO	-11PPM	NOx	47.10PPM	O2 5mn	0.78%
CO 5mn	-10PPM	NOx 5mn	71PPM	O2 20mn	0.78%	CO 20mn	-10PPM
NOx 20mn	71PPM						

0.00 O2

25.00 %

MANUAL Dec.14.95 09:48

O2	0.05%	CO	-10PPM	NOx	87.86PPM	O2 5mn	0.21%
CO 5mn	-10PPM	NOx 5mn	88PPM	O2 20mn	0.21%	CO 20mn	-10PPM
NOx 20mn	88PPM						

O2

CO

MANUAL Dec.14.95 09:47

O2	0.05%	CO	-10PPM	NOx	88.52PPM	O2 5mn	0.36%
CO 5mn	-10PPM	NOx 5mn	88PPM	O2 20mn	0.36%	CO 20mn	-10PPM
NOx 20mn	89PPM						

Dec.14 09:45

8.39% NOx 5mn 5PPM 0.00 25.00 %

Dec.14 09:45

O2

o08:29 o09:45 500mm/h

MANUAL Dec.14.95 08:29

0 10 20 30 40 50 60 70 80 90 100

O2	0.14%	CO	4424PPM ✓	NOx	60PPM	O2 5mn	0.95%
CO 5mn	30PPM	NOx 5mn	149PPM	O2 20mn	4.29%	CO 20mn	245PPM
NOx 20mn	49PPM						

NOx 20m 40PPM

0 10 20 30 40 50 60 70 80 90 100

25.00

MANUAL Dec.14.95 10:17	O2	1.13%	CO	0.7PPM	NOx	84.9PPM	O2 5mn	1.54%	NOx span
	CO 5mn	1PPM	NOx 5mn	48PPM	O2 20mn	1.54%	CO 20mn	1PPM	
	NOx 20m	48PPM							
MANUAL Dec.14.95 10:16	O2	0.06% ✓	CO	0.6PPM ✓	NOx	0.6PPM ✓	O2 5mn	0.08%	Zero
	CO 5mn	0PPM	NOx 5mn	1PPM	O2 20mn	0.08%	CO 20mn	0PPM	
	NOx 20m	1PPM							
MANUAL Dec.14.95 10:12	O2	0.12%	CO	140.7PPM ✓	NOx	0.4PPM	O2 5mn	2.93%	SI
	CO 5mn	315PPM	NOx 5mn	1PPM	O2 20mn	4.27%	CO 20mn	212PPM	
	NOx 20m	15PPM							
MANUAL Dec.14.95 10:11	O2	0.10%	CO	451.8PPM ✓	NOx	0.7PPM	O2 5mn	3.47%	CO span
	CO 5mn	383PPM	NOx 5mn	1PPM	O2 20mn	4.34%	CO 20mn	147PPM	
	NOx 20m	16PPM							
MANUAL Dec.14.95 10:10	O2	9.14% ✓	CO	73.0PPM	NOx	0.5PPM	O2 5mn	7.41%	O2 mid
	CO 5mn	6PPM	NOx 5mn	45PPM	O2 20mn	4.32%	CO 20mn	4PPM	
	NOx 20m	16PPM							
MANUAL Dec.14.95 10:09	O2	20.91% ✓	CO	-3.9PPM	NOx	0.5PPM	O2 5mn	5.40%	O2 span
	CO 5mn	-1PPM	NOx 5mn	56PPM	O2 20mn	3.87%	CO 20mn	-9PPM	
	NOx 20m	17PPM							
MANUAL Dec.14.95 10:08	O2	0.03%	CO	-0.940M	NOx	46.6PPM ✓	O2 5mn	0.07%	NOx mid
	CO 5mn	0PPM	NOx 5mn	75PPM	O2 20mn	3.86%	CO 20mn	-3PPM	
	NOx 20m	18PPM							
MANUAL Dec.14.95 10:07	O2	0.07%	CO	0.0PPM	NOx	89.2PPM ✓	O2 5mn	0.07%	NOx span
	CO 5mn	0PPM	NOx 5mn	83PPM	O2 20mn	3.33%	CO 20mn	-8PPM	
	NOx 20m	19PPM							
MANUAL Dec.14.95 10:05	O2	0.06% ✓	CO	0.3PPM ✓	NOx	0.2PPM ✓	O2 5mn	6.97%	Zero
	CO 5mn	-5PPM	NOx 5mn	1PPM	O2 20mn	3.71%	CO 20mn	-9PPM	
	NOx 20m	20PPM							
MANUAL Dec.14.95 09:59	O2	0.04%	CO	-13PPM	NOx	47.6PPM	O2 5mn	0.04%	

Dec.14 10:15

System Cal @ Inlet

Ko2

10:05 - 10:15 50mm/h

Reuche Cal (2)11/95 L Pacific

2.10% NOx 5mn 50PPM Dec.14 10:00 O2 100.0 PPM NOx

MANUAL	Dec.14.95	10:27		
O2	0.18%	CO 443.8PPM	NOx 1.0PPM	O2 5m 7.09%
CO 5m	34PPM	NOx 5m 23PPM	O2 20m 7.19%	CO 20m 69PPM
NOx 20m	24PPM			

CO Span

MANUAL	Dec.14.95	10:25		
O2	20.65%	CO -2.1PPM	NOx 1.4PPM	O2 5m 4.36%
CO 5m	0PPM	NOx 5m 37PPM	O2 20m 6.62%	CO 20m 49PPM
NOx 20m	27PPM			

O2 Span

MANUAL	Dec.14.95	10:24		
O2	0.13%	CO 0.2PPM	NOx 85.3PPM	O2 5m 0.15%
CO 5m	0PPM	NOx 5m 30PPM	O2 20m 6.70%	CO 20m 54PPM
NOx 20m	25PPM			

NOx Span

MANUAL	Dec.14.95	10:23		
O2	0.13%	CO -0.2PPM	NOx 0.8PPM	O2 5m 0.13%
CO 5m	0PPM	NOx 5m 1PPM	O2 20m 6.95%	CO 20m 60PPM
NOx 20m	23PPM			

zero

Dec.14 10:22

system cal outlet

MANUAL	Dec.14.95	10:19		
O2	0.06%	CO 0.9PPM	NOx 89.2PPM	O2 5m 1.32%
CO 5m	224PPM	NOx 5m 40PPM	O2 20m 6.95%	CO 20m 95PPM
NOx 20m	30PPM			

NOx Span

MANUAL	Dec.14.95	10:17		
O2	0.08%	CO 448.3PPM	NOx 0.8PPM	O2 5m 0.09%
CO 5m	448PPM	NOx 5m 1PPM	O2 20m 8.15%	CO 20m 79PPM
NOx 20m	26PPM			

Dec.14 10:17

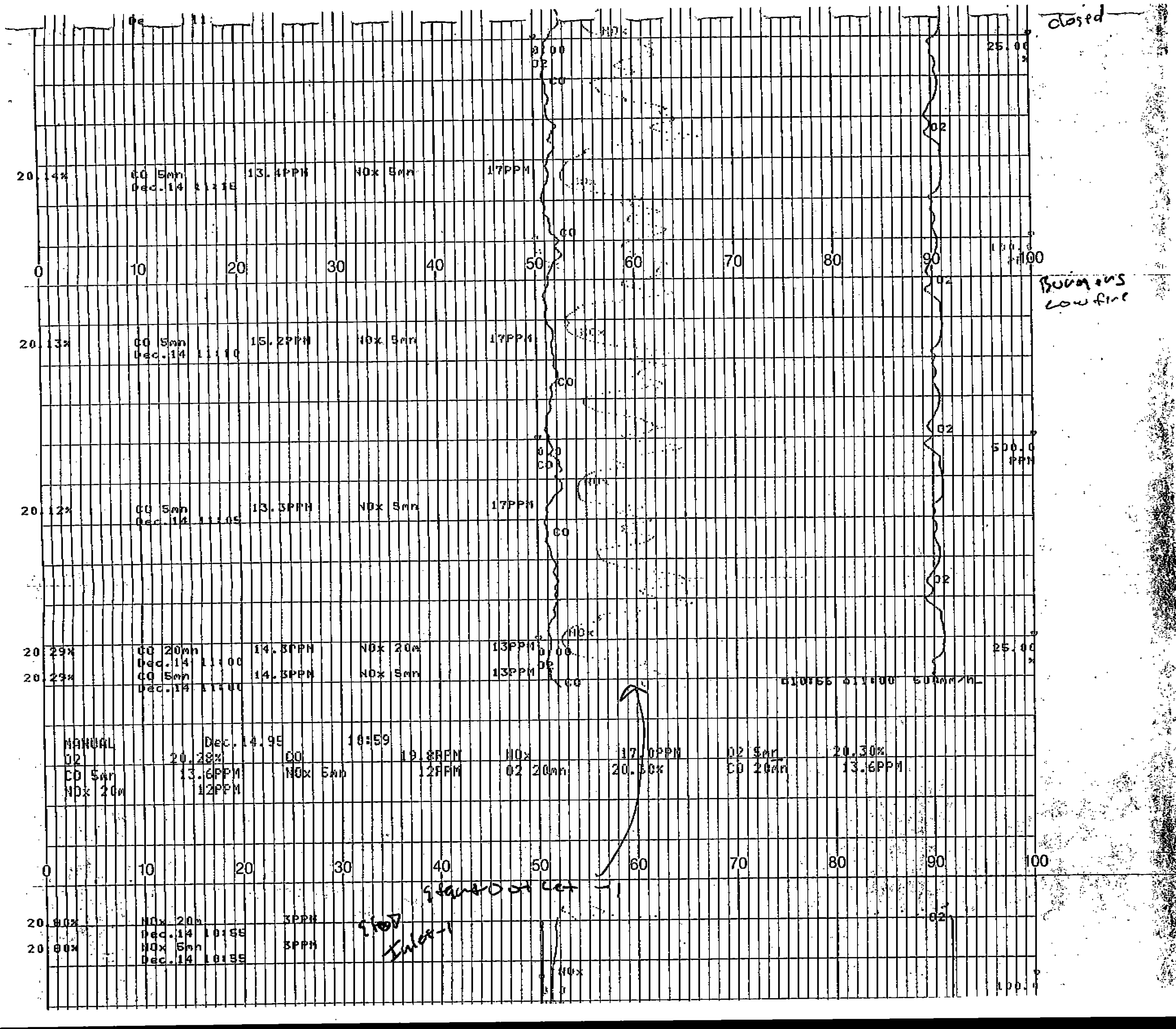
CO Span

MANUAL	Dec.14.95	10:16		
O2	20.76%	CO -2.1PPM	NOx 0.9PPM	O2 5m 6.95%
CO 5m	0PPM	NOx 5m 40PPM	O2 20m 6.55%	CO 20m 0PPM
NOx 20m	40PPM			

O2 Span

MANUAL	Dec.14.95	10:17		
O2	1.13%	CO 0.7PPM	NOx 84.9PPM	O2 5m 1.54%
CO 5m	1PPM	NOx 5m 18PPM	O2 20m 1.5[illegible]%	CO 20m 1PPM

NOx span


closed
20.14% CO 5mn Dec.14 11:15 13.4PPM NOx 5mn 17PPM
Burners Low fire
20.13% CO 5mn Dec.14 11:10 15.2PPM NOx 5mn 17PPM
500.0 PPM
20.12% CO 5mn Dec.14 11:05 13.3PPM NOx 5mn 17PPM
20.29% CO 20mn Dec.14 11:00 14.3PPM NOx 20m 13PPM
20.29% CO 5mn Dec.14 11:00 14.3PPM NOx 5mn 13PPM
25.00%
MANUAL Dec.14.95 10:59
O2 20.28% CO 19.8PPM NOx 17.0PPM O2 5mn 20.30%
CO 5mn 13.6PPM NOx 5mn 12PPM O2 20mn 20.30% CO 20mn 13.6PPM
NOx 20m 12PPM
0 10 20 30 40 50 60 70 80 90 100
Start Outlet-1
Stop Inlet-1
20.80% NOx 20m Dec.14 10:55 3PPM
20.80% NOx 5mn Dec.14 10:55 3PPM
CO
NOx
O2

MANUAL Dec.14.95 11:33
O2 0.14% ✓ CO -5.5PPM ✓ NOx 1.5PPM ✓ O2 5mn 8.70%
CO 5mn 129.0PPM NOx 5mn 2PPM O2 20mn 11.80% CO 20mn 62.9PPM
NOx 20m 17PPM

O2
0.00

25.00

Inlet of system cal

MANUAL Dec.14.95 11:30
O2 0.17% CO 434.0PPM ✓ NOx 1.6PPM O2 5mn 0.19%
CO 5mn 433.5PPM NOx 5mn 2PPM O2 20mn 11.98% CO 20mn 66.8PPM
NOx 20m 21PPM

11.12% CO 5mn 48.7PPM NOx 5mn 30PPM
Dec.14 11:30

CO span

MANUAL Dec.14.95 11:28
O2 20.56% ✓ CO -6.8PPM NOx 2.2PPM O2 5mn 0.15%
CO 5mn 0.5PPM NOx 5mn 43PPM O2 20mn 12.69% CO 20mn 20.7PPM
NOx 20m 26PPM

O2 span

MANUAL Dec.14.95 11:27
O2 0.17% CO -4.4PPM NOx 89.3PPM ✓ O2 5mn 0.00%
CO 5mn 3.8PPM NOx 5mn 4PPM O2 20mn 13.06% CO 20mn 25.1PPM
NOx 20m 23PPM

0 10 20 30 40 50 60 70 80 90 100

NOx span

500.0 PPM

14.45% CO 5mn 34.9PPM NOx 5mn 14PPM
Dec.14 11:25

MANUAL Dec.14.95 11:24
O2 0.18% ✓ CO -4.2PPM ✓ NOx 1.8PPM ✓ O2 5mn 15.42%
CO 5mn 37.5PPM NOx 5mn 15PPM O2 20mn 15.42% CO 20mn 37.5PPM
NOx 20m 15PPM

Zero

Stop outlet-1
Outlet system cal

20.14% CO 20mn 13.9PPM NOx 20m 17PPM
Dec.14 11:20
20.18% CO 5mn 13.7PPM NOx 5mn 17PPM
Dec.14 11:20

Press closed

0.00
O2
CO

25.00

20.83% CO 5mn Dec.14 12:10 -0.1PPM NOx 5mn 3PPM

CO

O2

0.00 O2 NOx 25.00 %

20.83% CO 5mn Dec.14 12:00 -0.5PPM NOx 5mn 3PPM

0 10 20 30 40 50 60 70 80 90 100

CO

O2

NOx

20.83% CO 20mn Dec.14 12:00 -0.9PPM NOx 20m 3PPM 100.0 PPM

20.83% CO 5mn Dec.14 12:00 -0.8PPM NOx 5mn 3PPM

11:37 12:00 500mm/h

start Inlet-2

MANUAL		Dec.14.95		11:37					
O2	8.16%	CO	437.3PPM	NOx	1.6PPM	O2 5mn	13.96%		
CO 5mn	134.3PPM	NOx 5mn	3PPM	O2 20mn	11.02%	CO 20mn	67.2PPM		
NOx 20m	20PPM								

CO span

0.0 CO O2 500.0 PPM

MANUAL		Dec.14.95		11:35					
O2	20.38%	CO	-7.5PPM	NOx	1.7PPM	O2 5mn	14.90%		
CO 5mn	-6.5PPM	NOx 5mn	5PPM	O2 20mn	11.03%	CO 20mn	51.6PPM		
NOx 20m	22PPM								

O2 span

5.00% CO 5mn Dec.14 11:35 82.0PPM NOx 5mn 26PPM CO NOx 500.0 PPM

0 10 20 30 40 50 60 70 80 90 100

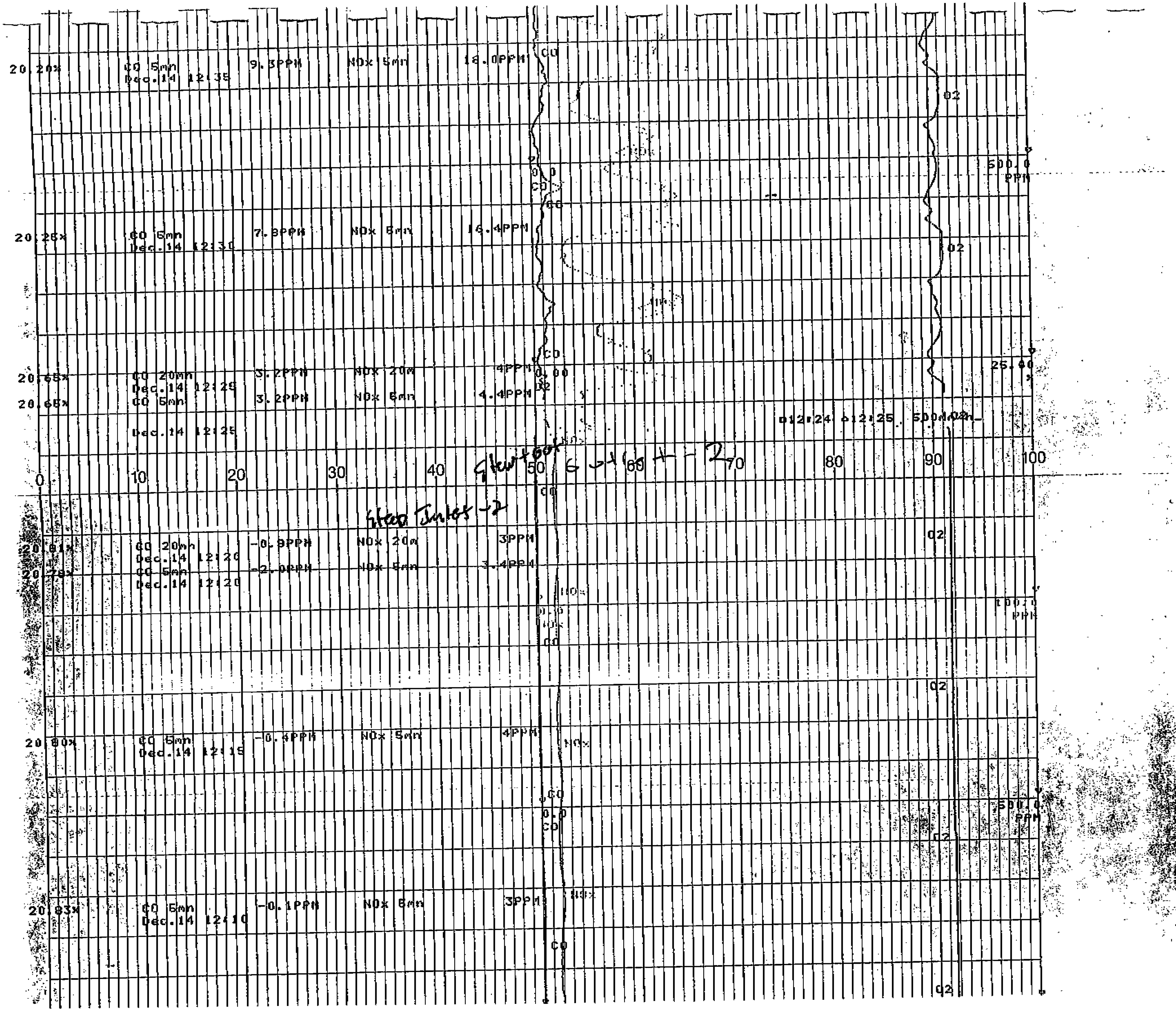
MANUAL		Dec.14.95		11:34					
O2	0.12%	CO	-5.1PPM	NOx	90.8PPM	O2 5mn	8.31%		
CO 5mn	88.6PPM	NOx 5mn	21PPM	O2 20mn	10.73%	CO 20mn	56.6PPM		
NOx 20m	122PPM								

NOx span

0.0 CO NOx 500.0 PPM

MANUAL		Dec.14.95		11:33					
O2	0.14%	CO	-5.5PPM	NOx	1.5PPM	O2 5mn	8.70%		
CO 5mn	129.0PPM	NOx 5mn	2PPM	O2 20mn	11.80%	CO 20mn	62.9PPM		
NOx 20m	17PPM								

Zero


20.20% CO 5mn Dec.14 12:35 9.3PPM NOx 5mn 18.0PPM
20.25% CO 5mn Dec.14 12:30 7.8PPM NOx 5mn 16.4PPM
20.65% CO 20mn Dec.14 12:25 3.2PPM NOx 20m 4PPM
20.65% CO 5mn 3.2PPM NOx 5mn 4.4PPM
Dec.14 12:25
20.81% CO 20mn Dec.14 12:20 -0.9PPM NOx 20m 3PPM
20.78% CO 5mn Dec.14 12:20 -2.0PPM NOx 5mn 3.4PPM
20.80% CO 5mn Dec.14 12:15 -0.4PPM NOx 5mn 4PPM
20.83% CO 5mn Dec.14 12:10 -0.1PPM NOx 5mn 3PPM
0 10 20 30 40 50 60 70 80 90 100
12:24 12:25
500.0 PPM
25.00
100.0 PPM
CO
NOx
O2
Steep Inlet -2
Stewart 50% 6 → 60 + – 2

O2 4.23% NOx 5mn 2.[illegible]PPM 12.[illegible]% CO 20mn 30.4PPM

CO 5mn 13.9[illegible]

NOx 20m 18.3PPM

Dec.14 12:55

span

MANUAL Dec.14.95 12:53

O2 20.59% CO -11.6PPM NOx 2.5PPM O2 5mn 5.43%

CO 5mn -9.7PPM NOx 5mn 29.4PPM O2 20mn 11.07% CO 20mn 2.6PPM

NOx 20m 20.9PPM

O2 span

MANUAL Dec.14.95 12:52

O2 0.20% CO -9.4PPM NOx 90.2PPM O2 5mn 0.84%

CO 5mn -9.2PPM NOx 5mn 23.0PPM O2 20mn 11.57% CO 20mn 17.5PPM

NOx 20m 17.1PPM

not span

MANUAL Dec.14.95 12:51

O2 0.17% CO -9.4PPM NOx 2.3PPM O2 5mn 0.18%

CO 5mn -9.4PPM NOx 5mn 2.4PPM O2 20mn 13.68% CO 20mn 23.0PPM

NOx 20m 12.3PPM

Zero

16.47% CO 5mn 29.7PPM NOx 5mn 14.4PPM

Dec.14 12:50

500.0 PPM

Outlet System Cal

20.16% CO 20mn 8.4PPM NOx 20m 17.9PPM

Dec.14 12:45

20.08% CO 5mn 8.3PPM NOx 5mn 18.7PPM

Dec.14 12:45

25.00 %

0 10 20 30 40 50 60 70 80 90 100

20.12% CO 5mn 8.3PPM NOx 5mn 18.5PPM

Dec.14 12:40

100.0 PPM

20.20% CO 5mn 9.3PPM NOx 5mn 18.0PPM

Dec.14 12:35

MAN | Dec 95 | 13 |
O2 0.16% | CO 140.6PPM | NOx 2.1PPM | O2 5m 2.29%
CO 5m 236.3PPM | NOx 5m 2.4PPM | O2 20m 2.29% | CO 20m 236.3PPM
NOx 20m 2.4PPM

CO mid

MANUAL Dec. 14.95 13:04
O2 0.14% | CO 450.7PPM ✓ | NOx 2.2PPM | O2 5m 4.30%
CO 5m 190.1PPM | NOx 5m 2.6PPM | O2 20m 9.41% | CO 20m 67.1PPM
NOx 20m 14.8PPM

CO span

13:03 13:04 500

MANUAL Dec. 14.95 13:03
O2 0.13% | CO 0.0PPM ✓ | NOx 2.1PPM | O2 5m 5.18%
CO 5m 121.0PPM | NOx 5m 2.8PPM | O2 20m 10.04% | CO 20m 44.4PPM
NOx 20m 15.5PPM

Zero

Back cal for CO adjustment

25.00

MANUAL Dec. 14.95 13:01
O2 0.17% | CO 431.4PPM ✓ | NOx 2.5PPM | O2 5m 9.96%
CO 5m 224.9PPM | NOx 5m 2.5PPM | O2 20m 11.09% | CO 20m 42.5PPM
NOx 20m 17.6PPM

CO span

0 10 20 30 40 50 60 70 80 90 100

25.00

MANUAL Dec. 14.95 12:59
O2 20.73% ✓ | CO -11.5PPM | NOx 2.5PPM | O2 5m 9.46%
CO 5m 44.2PPM | NOx 5m 19.6PPM | O2 20m 11.11% | CO 20m 26.5PPM
NOx 20m 19.0PPM

O2 span

MANUAL Dec. 14.95 12:59
O2 0.16% | CO -9.6PPM | NOx 91.1PPM ✓ | O2 5m 7.85%
CO 5m 58.1PPM | NOx 5m 14.6PPM | O2 20m 11.10% | CO 20m 28.8PPM
NOx 20m 17.6PPM

NOx span

MANUAL Dec. 14.95 12:57
O2 0.16% ✓ | CO -10.0PPM ✓ | NOx 2.2PPM ✓ | O2 5m 9.93%
CO 5m 78.5PPM | NOx 5m 3.0PPM | O2 20m 11.84% | CO 20m 31.8PPM
NOx 20m 15.2PPM

Zero

Finish w/ Klein cal

100.0 PPM

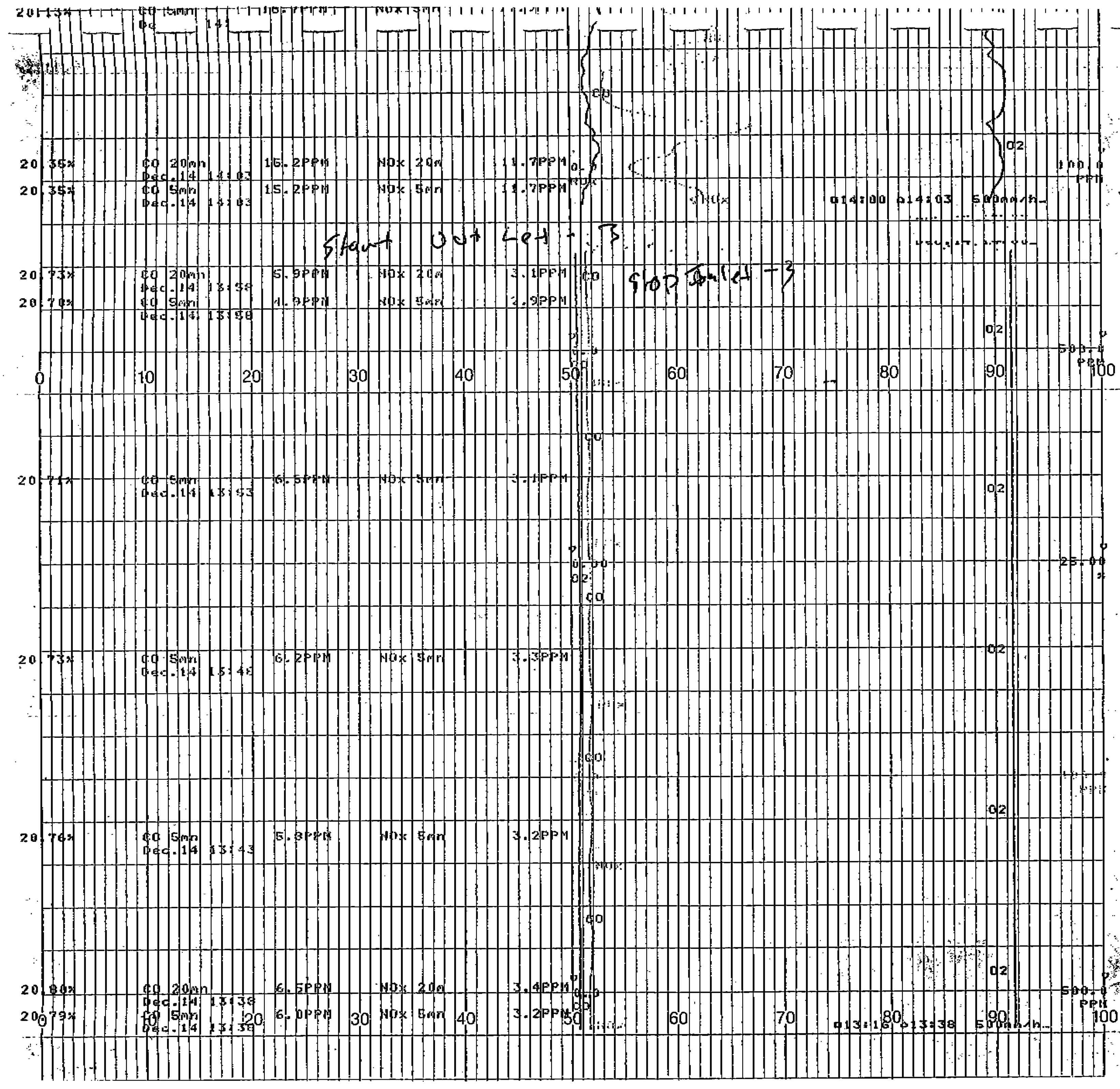
MANUAL Dec. 14.95 12:55
O2 0.28% | CO 425.7PPM ✓ | NOx 2.4PPM | O2 5m 0.41%
CO 5m 423.9PPM | NOx 5m 2.4PPM | O2 20m 12.04% | CO 20m 30.4PPM
NOx 20m 18.3PPM

CO span

Dec.14 12:55

100.0 PPM

MANUAL Dec. 14.95 12:53
O2 20.59% ✓ | CO -11.6PPM | NOx 2.5PPM | O2 5m 5.43%



20.35% CO 20mn Dec.14 14:03 15.2PPM NOx 20m 11.7PPM
20.35% CO 5mn Dec.14 14:03 15.2PPM NOx 5mn 11.7PPM
014:00 014:03 500mm/h
Start Out Let - 3
20.73% CO 20mn Dec.14 13:58 5.9PPM NOx 20m 3.1PPM
Stop Inlet - 3
20.70% CO 5mn Dec.14 13:58 4.9PPM NOx 5mn 2.9PPM
20.71% CO 5mn Dec.14 13:53 6.5PPM NOx 5mn 3.1PPM
20.73% CO 5mn Dec.14 13:48 6.2PPM NOx 5mn 3.3PPM
20.76% CO 5mn Dec.14 13:43 5.8PPM NOx 5mn 3.2PPM
20.80% CO 20mn Dec.14 13:38 6.5PPM NOx 20m 3.4PPM
20.79% CO 5mn Dec.14 13:38 6.0PPM NOx 5mn 3.2PPM
013:18 013:38 500mm/h
0 10 20 30 40 50 60 70 80 90 100
CO
NOx
O2
500.0 PPM
25.00 %

O2   [illegible]   NOx 5mn   27.0PPM   O2 20mn   8.71%   CO 20mn   29.4PPM
CO 5mn   29.4PPM
NOx 20m   27.0PPM

NOx span

MANUAL   Dec.14.95   14:26
O2   0.15%   CO   0.3PPM   NOx   91.2PPM   O2 5mn   7.42%
CO 5mn   41.9PPM   NOx 5mn   21.9PPM   O2 20mn   7.42%   CO 20mn   41.9PPM
NOx 20m   21.9PPM

NOx span

MANUAL   Dec.14.95   14:25
O2   0.18%   CO   -0.2PPM   NOx   2.4PPM   O2 5mn   10.99%
CO 5mn   64.3PPM   NOx 5mn   10.8PPM   O2 20mn   10.99%   CO 20mn   64.3PPM
NOx 20m   10.8PPM

zero

Outlet system cal

End outlet - 3

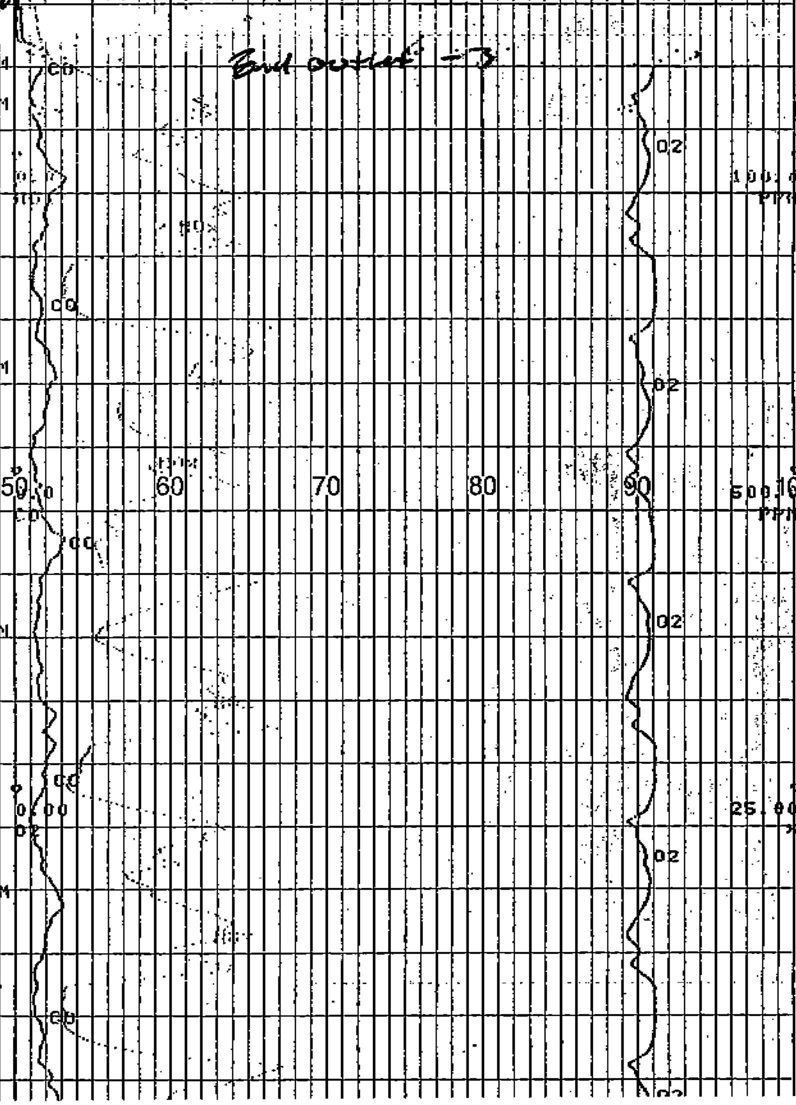
20.14%   CO 20mn   17.0PPM   NOx 20m   17.9PPM
Dec.14 14:23
20.13%   CO 5mn   17.4PPM   NOx 5mn   16.7PPM
Dec.14 14:23

20.17%   CO 5mn   16.4PPM   NOx 5mn   16.5PPM
Dec.14 14:18

0   10   20   30   40   50   60   70   80   90   100

20.13%   CO 5mn   17.7PPM   NOx 5mn   18.4PPM
Dec.14 14:13

20.13%   CO 5mn   16.7PPM   NOx 5mn   17.9PPM
Dec.14 14:08



20.80% CO 20mn 6.5PPM NOx 20m 3.4PPM O2
Dec.14 13:38
20.79% CO 5mn 6.0PPM NOx 5mn 3.2PPM
Dec.14 13:38

0 10 20 30 40 50 60 70 80 90 100
o13:18 o13:38 500mm/h

Start Inlet - 3

TRC ENVIRONMENTAL

8.36% CO 5mn 163.7PPM NOx 5mn 3.1PPM 0.00 25.00 %
Dec.14 13:18

MANUAL		Dec.14.95		13:14			
O2	0.18%	CO	447.5PPM	NOx	2.2PPM	O2 5mn	6.91%
CO 5mn	172.0PPM	NOx 5mn	3.1PPM	O2 20mn	5.94%	CO 20mn	165.3PPM
NOx 20m	2.8PPM						

span

25.00 %

MANUAL		Dec.14.95		13:12			
O2	0.21%	CO	1.6PPM	NOx	2.1PPM	O2 5mn	11.69%
CO 5mn	90.2PPM	NOx 5mn	3.8PPM	O2 20mn	7.27%	CO 20mn	136.9PPM
NOx 20m	2.9PPM						

zero

6.13% CO 5mn 159.7PPM NOx 5mn 2.5PPM 100.0 PPM
Dec.14 13:30

System cal for CO outlet

MANUAL		Dec.14.95		13:09			
O2	0.16%	CO	447.5PPM	NOx	2.3PPM	O2 5mn	4.80%
CO 5mn	141.0PPM	NOx 5mn	2.5PPM	O2 20mn	4.30%	CO 20mn	141.0PPM
NOx 20m	2.5PPM						

span

0 10 20 30 40 50 60 70 80 90 100

MANUAL		Dec.14.95		13:08			
O2	0.08%	CO	1.4PPM	NOx	2.1PPM	O2 5mn	6.72%
CO 5mn	84.7PPM	NOx 5mn	2.6PPM	O2 20mn	6.72%	CO 20mn	84.7PPM
NOx 20m	2.6PPM						

zero

500.0 PPM

System cal for CO Inlet

MANUAL		Dec.14.95		13:05			
O2	0.16%	CO	140.6PPM	NOx	2.1PPM	O2 5mn	2.29%
CO 5mn	236.3PPM	NOx 5mn	2.4PPM	O2 20mn	2.29%	CO 20mn	236.3PPM
NOx 20m	2.4PPM						

CO mid

MANUAL		Dec.14.95		13:04			
O2	0.14%	CO	450.7PPM	NOx	2.2PPM	O2 5mn	4.30%

Appendix B

Analytical Data and Data Summaries

RTO Inlet
Formaldehyde, NOx, and CO Emissions

TEST	********	In-1	In-2	In-3
LOCATION	********	RTO -Inlet	RTO -Inlet	RTO -Inlet
FIRM	********	LP	LP	LP
TIME	********	1035-1135	1200-1300	1338-1438
DATE	********	12-14-95	12-14-95	12-14-95
PROJECT NO.	********	19624	19624	19624
BAROMETRIC PRESSURE	in. Hg	30.02	30.02	30.02
STACK AREA	ft_2	16.22	16.22	16.22
NOZZLE DIAMETER	in.			
SAMPLING TIME	min.	60	60	60
DRY GAS METER CAL FACTOR [Y]	********	1.00	1.00	1.00
PITOT COEFFICIENT	********	0.84	0.84	0.84
AVG. SQUARE DELTA P	in. H_2O	1.382	1.390	1.395
AVG. DELTA H	in. H_2O	1.88	1.88	1.88
AVG. METER TEMP.	$_oF$	40	41	39
STATIC PRESSURE	in. H_2O	-4.55	-4.65	-4.70
AVG. STACK TEMPERATURE	$_oF$	102	104	104
SAMPLE VOLUME	ft_3	42.66	41.51	43.67
WATER COLLECTED	ml	13.0	13.0	14.0
CO 2	%	0	0	0
O 2	%	20.8	20.9	20.8
NOx	ppm	1.8	2.1	0.9
CO	ppm	16.3	7.1	6.1
N 2	%	79.2	79.1	79.2
TOTAL FORMALDEHYDE CATCH	mg	9.25	9.96	12.212
SAMPLE VOLUME DRY	DSCF	45.41	44.10	46.57
MOISTURE	%	1.3	1.4	1.4
MOLECULAR WEIGHT OF STACK GAS	lb/lb-mole	28.69	28.69	28.68
STACK VELOCITY	FPM	4836	4875	4893
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	78432	79065	79364
VOLUMETRIC FLOWRATE, STANDARD	SCFM	73109	73420	73688
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	72137	72415	72660
ISOKINETIC RATIO	%	ERR	ERR	ERR
FORMALDEHYDE EMISSION CONC	ppm	5.8680	6.5139	7.5622
FORMALDEHYDE EMISSION RATE	lb/hour	1.979	2.205	2.568
NOx EMISSION RATE	lb/hr	0.931	1.090	0.469
CO EMISSION RATE	lb/hr	5.129	2.243	1.934

RTO Outlet
Formaldehyde, NOx, and CO Emissions

TEST	*********	out-1	out-2	out-3
LOCATION	*********	RTO-outlet	RTO-outlet	RTO-outlet
FIRM	*********	LP	LP	LP
TIME	*********	1035-1135	1200-1300	1338-1438
DATE	*********	12-14-95	12-14-95	12-14-95
PROJECT NO.	*********	19624	19624	19624
BAROMETRIC PRESSURE	in. Hg	30.02	30.02	30.02
STACK AREA	ft^2	32.59	32.59	32.59
NOZZLE DIAMETER	in.			
SAMPLING TIME	min.	60	60	60
DRY GAS METER CAL FACTOR [Y]	*********	1.00	1.00	1.00
PITOT COEFFICIENT	*********	0.84	0.84	0.84
AVG. SQUARE DELTA P	in. H_2O	0.756	0.751	0.763
AVG. DELTA H	in. H_2O	1.75	1.75	1.75
AVG. METER TEMP.	^oF	44	47	45
STATIC PRESSURE	in. H_2O	-0.42	-0.42	-0.42
AVG. STACK TEMPERATURE	^oF	232	234	235
SAMPLE VOLUME	ft^3	41.35	43.00	41.44
WATER COLLECTED	ml	20.0	20.0	23.0
CO 2	%	0	0	0
O 2	%	20.3	20.4	20.4
NOx	ppm	15.9	16	15.6
CO	ppm	16.5	15.8	16.6
N 2	%	79.7	79.6	79.6
TOTAL FORMALDEHYDE CATCH	mg	0.442	0.451	0.495
SAMPLE VOLUME DRY	DSCF	43.65	45.12	43.66
MOISTURE	%	2.1	2.0	2.4
MOLECULAR WEIGHT OF STACK GAS	lb/lb-mole	28.58	28.59	28.55
STACK VELOCITY	FPM	2925	2910	2959
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	95318	94835	96425
VOLUMETRIC FLOWRATE, STANDARD	SCFM	72896	72370	73477
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	71357	70891	71700
ISOKINETIC RATIO	%	ERR	ERR	ERR
FORMALDEHYDE EMISSION CONC	ppm	0.2917	0.2883	0.3270
FORMALDEHYDE EMISSION RATE	lb/hour	0.097	0.096	0.110
NOx EMISSION RATE	lb/hr	8.131	8.129	8.016
CO EMISSION RATE	lb/hr	5.136	4.886	5.192

TRC ENVIRONMENTAL CORPORATION, INC.
5 WATERSIDE CROSSING, WINDSOR, CT 06095
860-298-6326
Connecticut Certification No. PH-0426
AIHA Laboratory Accreditation No. 259

LABORATORY REPORT

LOUISIANA PACIFIC

Lab Number:	16322
Date Rec'd:	12/15/95
Date Analyzed:	12/22/95
Sample Description:	NCASI Formaldehyde Method
No. Samples:	6 Samples and 1 Blank
Lab Project No.:	10902-3001-00005
TRC Project No:	19624

Sample Number	Total Volume (mls.)	Formaldehyde (ug)
*FORM-IN-1	250	9250
*FORM-IN-2	200	9960
*FORM-IN-3	172	12212
FORM-OUT-1	228	442
FORM-OUT-2a	208	451
**FORM-OUT-2b	208	447
FORM-OUT-3	221	495
HPLC Blank	149	ND<15

*Initial analysis of inlet samples using a 2 ml aliquot of sample was out of calibration. Because all inlet samples were out of calibration, the samples were diluted using 0.2 ml aliquot of sample and 1.8 ml aliquot of distilled water. After the dilution of all inlet samples they came within the calibration curve.

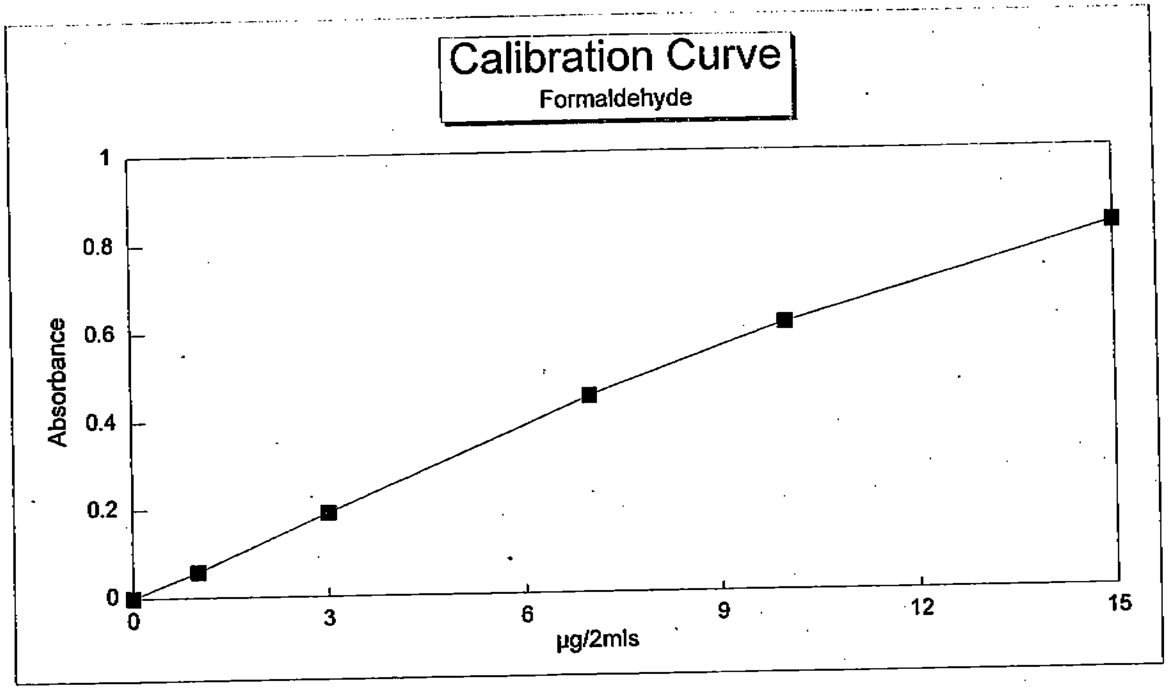
**Duplicate analysis of sample number FORM-OUT-2.

Analyst: Lance Cotton/Marge Flanagan

Reviewed by: [signature] or ____________________

Margaret F. Flanagan
Quality Control Manager

Gary L. Ritter, CIH, CHMM, LSP
Laboratory Director



FORMALDEHYDE

(ug/2mls)	(Absorbance)
0	0
1	0.058
3	0.19
7	0.448
10	0.61
15	0.83

Regression Output:

Constant		0.016786
Std Err of Y Est		0.030724
R Squared		0.993018
No. of Observations		6
Degrees of Freedom		4
X Coefficient(s)	0.056536	
Std Err of Coef.	0.00237	

From Page No.___

Sample #	Volume	ml Aliquot	Abs@412
FORM-IN-1	250 mls.	2.0	Over Cal
		0.2	0.435
FORM-IN-2	200 mls.	2.0	Over Cal
		0.2	0.580
FORM-IN-3	172 mls.	2.0	Over Cal
		0.2	0.182
FORM-OUT-1	228 mls.	2.0	0.236
FORM-OUT-2	208 mls	2.0	0.262
Out 2 dup		2.0 mls	0.260
FORM-OUT-3	221 mls.	2.0	0.270
HPLC Blank	149 mls	2.0	0.000

pH of Sodium sulfite 9.72 No Good

ph 12.48 after adding 10 mls. of formaldehyde sol'n.

.25 mls. of Formaldehyde sol'n.

(1) 9.92 pH of Sodium Sulfite took 5 mls. of Sodium Sulfite and got

12.27 pH after adding 10.2 ml of formaldehyde stock.

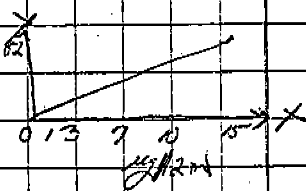
(2) 9.97 pH of 5 mls. of Sodium Sulfite sol'n.

12.25 pH after adding 2 mls. of formaldehyde stock. 12

Calculation

Linear Regression $x = \mu g/2mls$

y = Absorbance



for Sample enter Absorbance get equivalent μg/2ml Formaldehyde.

$$\mu g \text{ Formaldehyde in Sampler} = \frac{\mu g}{2ml} \times \text{Total Volume} \times \left(\frac{2ml}{\text{aliquot}}\right)$$

Limit of detection for 0.01 Abs = ~ 0.2 μg / 2mls

Took 0.2 mls. sample + 1.8 mls. of DI H_2O + 2 mls. Acetylacetone Reagent

To Page No.

Witnessed & Understood by me,	Date	Invented by [signature]	Date
		Recorded by	

tandardize CH_2O method 3500 N105#

No. 12-22-98

[illegible] 17.8 ml 37% Formaldehyde → 1 l H_2O

[illegible] 1.13 M Sodium Sulfite

MW Na_2SO_3 = 126.04
∴ 1.13 m = 142.4 g/l or 14.24 g/100 ml

titrant 0.02003 N H_2SO_4

Standardization
25 + 25 + 25 - pH only 11.51 No Good
2 ml of Formaldehyde stock 23.25 mls titrant } Ave 23.22 ml
2 ml " " 23.18 mls titrant }

$$\text{mg/ml Formaldehyde} = \frac{30.0\,(.02003)\,(23.22\text{ ml})}{2.0\text{ ml aliquot}}$$

= 6.98 mg/ml Formaldehyde

= 6980 µg/ml

To prepare 10.0 µg/ml Working Solution dilute 1.43 ml stock to 1.0 liter water

$$\frac{10\,\mu g}{6980} = 0.00143 = 10\,\mu g/ml$$

Prepare Standards (X)	ml WS (10 µg/ml)	Abs 412 nm (Y)
0 µg/2ml	0	0.000
1	0.1	0.058
3	0.3	0.190 (0.196) ok
7	0.7	0.448
10	1.0	0.610
15	1.5	0.830 0.83 ate

To Page No.

From Page No.__

(1) FORM-IN-1

$x = \frac{y-b}{M}$

y = Absorbance
b = constant
M = x coefficient(s)

$\frac{0.435 - 0.016786}{0.056536} = 7.40$/2mls. of sample

$\frac{7.40}{2mls} \times 250\ mls \times \frac{2mls.}{0.2mls.} =$ **9,250 ug Formaldehyde**

(2) FORM-IN-2

$x = \frac{y-b}{M}$

$\frac{0.580 - 0.016786}{0.056536} = 9.96$/2mls. of sample

$\frac{9.96}{2mls.} \times 200\ mls. \times \frac{2mls.}{0.2mls.} =$ **9,960 ug Formaldehyde**

(3) FORM-IN-3

$\frac{0.820 - 0.016786}{0.056536} = 14.20$/2mls. of sample

$\frac{14.20}{2mls.} \times 172\ mls. \times \frac{2mls.}{0.2mls.} =$ **12,212 ug Formaldehyde**

(4) FORM-OUT-1

$\frac{0.236 - 0.016786}{0.056536} = 3.88$ ug/2mls of sample

$\frac{3.88}{2mls.} \times 228\ mls. \times \frac{2mls.}{2mls.} =$ **442 ug Formaldehyde**

(5.) FORM-OUT-2

$\frac{0.262 - 0.016786}{0.056536} = 4.34$/2mls. of sample

To Page

Witnessed & Understood by me,	Date	Invented by	Date
		Recorded by Carrie Cutter	12/27/9[illegible]

Formaldehyde Calculations

Page No.

$\frac{4.34}{2 mls.} \times 208 mls. \times \frac{2 mls.}{2 mls.}$ = 451 ug Formaldehyde

FORM-OUT-3

$\frac{0.270 - 0.016786}{0.056536}$ = 4.48/2mls. of sample

$\frac{4.48}{2 mls.} \times 221 mls. \times \frac{2 mls.}{2 mls.}$ = 495 ug Formaldehyde

HPLC Blank

$\frac{0.00 - 0.016786}{0.056536}$ = $\frac{0.2 ug}{2 mls.} \times 149 mls. \times \frac{2 mls.}{2 mls.}$ = nd <15 Formal

FORM-OUT-2 (duplicate)

$\frac{0.260 - 0.016786}{0.056536}$ = 4.30/2mls. of sample

$\frac{4.30}{2 mls.} \times 208 mls. \times \frac{2 mls.}{2 mls.}$ = 447 ug Formaldehyde

TRC Environmental Consultants, Inc

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME		PARAMETERS	16322
19624	Louisiana Pacific			

SAMPLERS: (Signature) [signature] (Printed) [signature]

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	M202	Formaldehyde							REMARKS
TO-M202-1	12/13					1	X								
TO-M202-2	|					1	X								
TO-M202-3	|					1	X								
TO-Blank	12/13						X								
FORM-IN-1	12/14					1		X							
FORM-IN-2	|					1		X							
FORM-IN-3	|					1		X							
FORM-OUT-1	12/14					1		X							
FORM-OUT-2	|					1		X							
FORM-OUT-3	|					1		X							
FORM-H2O						1		X							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	12/15/95 1800				
(Printed) [signature]		(Printed)	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
		[signature]	12/15/95 12:00	
(Printed)		(Printed) Lance Cotton		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

Appendix C

Process Data

RTO TESTING readings every 10 minutes -

Fuel type________ Any meter conversion factors? ________

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

ALAN JONES

By Mark Chamberlain

Date: 1 12-14-95

Sheet ONE of

	TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRESSURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
	9:40 am	325	307	307	347	307	4.7	1558	1559	165	1561	214	.16	7917988'
	9:50	327	304	318	337	310	4.7	1554	1537	103	1535	247	.16	
1	10:00	328	305	316	340	309	4.5	1549	1545	103	1533	215	17	
	10:10	323	307	315	334	318	4.6	1537	1544	103	1531	219	17	
	10:20	325	307	317	332	318	4.4	1536	1544	101	1545	218	17	
	10:30	326	305	319	331	317	4.6	1531	1538	103	1543	218	17	.70
S	10:35	323	309	311	339	316	4.8	1536	1537	103	1541	218	16	7918200
1	10:45	323	309	309	345	313	4.6	1525	1530	101	1531	218	17	
	10:55	325	310	307	348	311	4.4	1530	1544	102	1542	218	16	
	11:05	326	307	321	332	316	4.6	1532	1538	104	1542	218	18	
	11:15	324	306	321	337	310	4.6	1538	1534	101	1541	215	18	
	11:25	325	308	319	334	318	4.5	1538	1545	105	1549	219	16	
F	11:35	324	310	316	340	316	4.7	1538	1545	106	1547	220	16	7922650
	11:45	325	310	319	339	317	4.5	1540	1545	106	1548	222	16	
	11:50	326	313	312	351	311	4.2	1527	1538	107	1541	221	16	
S	12:00	327	310	322	337	319	4.5	1537	1545	105	1548	221	16	7923363
	12:10	331	309	323	343	310	4.5	1543	1541	106	1545	218	18	
	12:20	332	310	322	345	309	4.6	1548	1546	106	1553	218	17	
	12:30	329	310	325	335	316	4.6	1530	1532	107	1538	220	17	
2	12:40	327	312	321	339	317	4.5	1536	1547	107	1549	223	16	
	12:50	326	314	317	346	316	4.8	1540	1542	108	1547	221	16	

RTO TESTING readings every 10 minutes -

Fuel type________ Any meter conversion factors? ________

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

DATE 12-14-95

By: Mark Chamberlain — ALAN JONES

Sheet TWO °F

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRESSURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
1:00	330	314	316	354	309	4.6	1541	1550	108	1561	222	16	7925725
1:10	332	312	322	349	309	4.7	1554	1555	109	1565	219	17	
1:20	332	311	322	343	312	4.5	1544	1537	109	1547	220	16	
1:30	331	310	328	339	316	4.2	1531	1527	108	1535	221	16	
1:38	332	311	329	340	316	4.1	1532	1526	109	1535	221	16	7927233
1:48	329	312	327	339	319	4.4	1531	1535	111	1544	223	18	
1:58	328	314	322	344	319	4.5	1537	1545	109	1547	224	16	
2:08	332	316	317	350	315	4.8	1532	1532	109	1535	221	17	
2:18	327	316	318	350	316	4.9	1530	1530	109	1532	221	17	
2:28	333	312	326	347	318	4.2	1532	1536	109	1535	219	17	
2:38	333	312	330	341	315	4.3	1534	1527	108	1535	220	17	7929640
2:40	328	315	322	344	319	4.6	1541	1545	109	1549	224		

#1

	Time	Load	temp	speed
start	1035	61	215	61
half	11:05	69	214	61
End	11:35	78	215	61

#2

start	12:00	84	213	61
half	12:30	93	215	61
End	1:00	101	215	61

#3

start	1:38	111	215	61
half	2:08	120	215	61
End	2:38	129	215	61

COMPLIANCE TESTING
PRESS RTO

(WAX) & ~~RESIN~~ USAGE

BOARD THICKNESS 7/16 DATE 12-14-95

READINGS TAKEN BY Chip Cameron LINE SPEED

WAX MDI —— PF RESIN ——

TIME HOURLY	WAX DAY TANK LEVEL	SL WAX FLOW RATE IN GAL	MDI DAY TANK LEVEL	MDI FLOW RATE IN GAL	PF RESIN DAY TANK	PF RESIN FLOW IN GAL
Start :35 Am	34½"					
:35 Am	27½/7" used	7" × 139#/in	= 973#			
:35 P.M	19⅜"/8⅛" used refilled to 38"		1129#			
:35 Pm	31¼"/6¾ used		938#			
35 P.M	22½/8¾" used refilled to 33½		1216#			
Testing complete						
		AVERAGE=	1094.3			
Total	30⅝"					
	30.63					
	1562.13#					

POUNDS OF PF RESIN / HOUR: ______

POUNDS OF MDI / HOUR: ______

POUNDS OF WAX / HOUR: 1094.3

RTO COMPLIANCE TEST

~~WAX~~ & RESIN USAGE

page ____ of ____

DATE 12-14-95 READINGS BY K. Blake

BOARD THICKNESS 7/16 LINE SPEED 61'

SPECS: WAX ________ MDI ________ PF ________

	TIME	WAX	MDI		PF	
#1	Start 10:35		Rate 0.5020	146	Rate 1.657	481
	Finish 11:35		176	TOTAL Used 30 GAL	575	TOTAL Used 94 GAL
#2	Start 12:00		0.5070	190	1.603	615
	Finish 1:00		218	28 used GAL	708	90 used GAL
#3	Start 1:38		0.5051	235	1.661	766
	Finish 2:38		266	31 GAL	860	94 GAL.
			AVE 29.666		92.666	

POUNDS OF PF RESIN / HOUR: 963.7 Phenolic-Total x 10.4 = pounds

POUNDS OF MDI / HOUR: 297 MDI-Total x 10.3 = pound

POUNDS OF WAX / HOUR: ________

Appendix D

Calibration Data

METHOD 5 MODULE CALIBRATION

ORIFICE/MODULE NO. ~~[illegible]~~ 8 56

BAROMETRIC PRESSURE (P_b) 29.92 in. Hg

DATE 12-16-95

DGM SERIAL NO. 2713311

STANDARD METER P 697

NAME S. Boyko

MODULE ORIFICE SETTING ΔH (in H_2O)	STANDARD METER VOLUME V_s (ft^3)	STANDARD METER FACTOR Y_s	STANDARD METER TEMPERATURE t_s (°F)	STANDARD METER PRESSURE ΔP_s (in H_2O)	MODULE METER VOLUME V_m (ft^3)	MODULE METER TEMPERATURE t_{mi} (°F)	MODULE METER TEMPERATURE t_{mo} (°F)	MODULE METER TIME θ (min.)	Y	ΔH@ (in H_2O)
0.5	5	1.00	67	-0.28	4.948	67	67	12.77	1.01	1.82
1.0	5	↓	↓	-0.40	4.882	66	65	9.11	1.01	1.86
1.5	10	↓	↓	-0.52	9.823	66	66	15.29	1.01	1.96
2.0	10	↓	↓	-0.62	9.831	67	66	13.24	1.01	1.96
3.0	10	↓	↓	-0.80	9.855	67	66	10.84	1.01	1.96
								AVERAGE	1.01	1.91

FOR CHECK, USE THE AVERAGE ΔH@ FOR ΔH:

$$Y = \frac{V_s \left(P_b + \frac{P_s}{13.6}\right)(t_m + 460)\, Y_s}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(t_s + 460)}$$

$$\Delta H@ = \left[\frac{(0.0317)\,\Delta H}{P_b\,(t_m + 460)}\right]\left[\frac{(t_s + 460)\,\theta}{V_s\, Y_s}\right]^2$$

ACCEPTANCE CRITERIA:

Each Y must be 1.00 ± 0.01

Average ΔH@ must be 1.84 ± 0.25

Each ΔH@ must be within 0.15 of the average ΔH@

TC Readout Calibrated with Constant Voltage Source ✓

t_{mi} 66 °F t_{mo} 66 °F Reference Thermometer 65.8 °F

Module Leak Check OK

Heater Box Control OK OK

Module Cleaned ok

Probe Heater Control ok

Pitot Tube Manometer Leak Check ok

Calibrated and Checked by Stephen Boyko Date 12-16-95

Reviewed by ______ Date ______

METHOD 5 MODULE CALIBRATION

80836

MODULE ORIFICE SETTING ΔH (in Hg)	STANDARD METER		DRY GAS METER		
	VOL_{Final}	$VOL_{Initial}$	VOL_{Final}	$VOL_{Initial}$	
	Air Leak	HG →	883.112	878.053	=
1.0			887.994	883.112	= 4.882
1.5			897.863	888.040	= 9.823
2.0			907.694	897.863	= 9.831
		Timer HG →	(917.549	907.694)	=
3.0			927.404	917.549	= 9.855
0.5			932.352	927.404	= 4.948

Operator S Boyko Date 12-16-95

Status (Circle One): (Green) Red

Was Any Maintenance Performed (Circle One): (Yes) [signature]

If Yes, Please Describe in Detail Below:

Heat Controller for the filter was Changed & Calibrated

TRC

METHOD 5 MODULE CALIBRATION

ORIFICE/MODULE NO. 80823

BAROMETRIC PRESSURE (P_b) 29.40 in. Hg

DATE 12-22-95

DGM SERIAL NO. 2547143

STANDARD METER P-697

NAME S. Bayko

MODULE ORIFICE SETTING ΔH (in H_2O)	STANDARD METER VOLUME V_s (ft^3)	STANDARD METER FACTOR Y_s	STANDARD METER TEMPERATURE t_s (°F)	STANDARD METER PRESSURE ΔP_s (in H_2O)	MODULE METER VOLUME V_m (ft^3)	MODULE METER TEMPERATURE t_{mi} (°F)	MODULE METER TEMPERATURE t_{mo} (°F)	MODULE METER TIME θ (min.)	Y	ΔH@ (in H_2O)
0.5	5	1.00	70	-0.30	5.008	71	70	12.96	1.00	1.91
1.0	5	↓	70	-0.40	5.018	72	71	9.25	1.00	1.95
1.5	10	↓	70	-0.54	10.063	72	72	14.91	.99	1.90
2.0	10	↓	70	-0.62	10.047	74	73	12.87	1.00	1.88
3.0	10	↓	70	-0.90	10.112	74	73	10.06	.99	1.72
								AVERAGE	1.00	1.87

FOR CHECK, USE THE AVERAGE ΔH@ FOR ΔH:

$$Y = \frac{V_s \left(P_b + \frac{P_s}{13.6}\right)(t_m + 460)\, Y_s}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(t_s + 460)}$$

$$\Delta H@ = \left[\frac{(0.0317)\,\Delta H}{P_b\,(t_m + 460)}\right]\left[\frac{(t_s + 460)\,\theta}{V_s\, Y_s}\right]^2$$

ACCEPTANCE CRITERIA:

Each Y must be 1.00 ± 0.01

Average ΔH@ must be 1.84 ± 0.25

Each ΔH@ must be within 0.15 of the average ΔH@

TC Readout Calibrated with Constant Voltage Source

t_{mi} 72 °F t_{mo} 72 °F Reference Thermometer 72.2 °F

Module Leak Check OK

Heater Box Control OK OK

Probe Heater Control OK

Module Cleaned OK

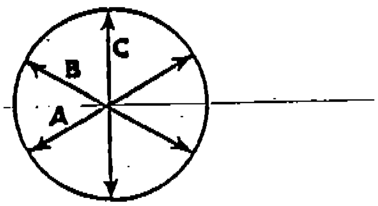
Pitot Tube Manometer Leak Check OK

Calibrated and Checked by [signature] Date 12-22-95

Reviewed by

TRC
NOZZLE CALIBRATION DATA SHEET

NOZZLE SET NO. SS SET 3 DATE 7-20-95 TECHNICIAN J Michaud



NOZZLE NO.	DIAMETER*	A	B	C	AVERAGE**
3-1		.189	.191	.192	.191
3-2		.256	.254	.255	.255
3-3		.378	.379	.378	.378
3-4		.507	.509	.506	.507
3-5		.129	.128	.127	.128
3-6		.740	.742	.741	.741
3-8		.323	.323	.323	.323

* Measure to nearest .001"
** Three measurements must be within .004" of each other

FILE # 563.15.1

RTO ENGINEERING TEST

LOUISIANA PACIFIC CORP.

HOULTON, MAINE

12/14/95

TABLE OF CONTENTS

ENGINEERING TEST DATA SUMMARY SHEET
FOR THE PRESS
HOULTON, MAINE

Prepared by: Mark Stile February 1, 1996

Press: Washington Iron Works: 12 opening 8X16 ft
Control Device: RTO Mfg. by Wheelabrator (5 cell)
RTO fuel: HD5 Propane

A. General Information

Pollutant: VOC, PM, CO, NOx Methods:1-5,19,202
Wood species & percent mix: Poplar 90% Hardwoods 10%
Permitted capacity: 443 Ton/day (Finished Product)

B. Run Specific Information - Process Parameters

	Test 1	Test 2	Test 3
Time Start/Stop	1035/1135	1200/1300	1338/1438
Production TFP/hr	20.33	20.75	19.59
Press Loads	17.917	17.667	17.583
Board Thickness:	Average QC Testing - 0.444 inch (7/16")		
Board Density:	Average QC Testing - 40.5 #/ft3		
Press Temp. °C.	214.6	214.3.	215
PF Resin #/hr@100% solids:	595.4	570	595.4
MDI Resin #/hr	312	291.2	322.4
Wax #/hr	973	938	1216

C. Monitored Control Equipment Parameters

	Test 1	Test 2	Test 3
RTO combustion chamber temp:	1541.9	1548.7	1537.5
Burner firing rate - Btu/hr:	16.744	8.875	9.078
Burner fuel usage - cu ft:	4450	2362	2407
Burner fuel usage - Gal:	183	97	99

Combustion chamber set point: 1535 °F.
36.39 cu ft propane vapor @ 60°F / Gal liquid

D. Run Specific Information - Emissions

Pollutant detected ?	______	______	______
Pollutant lb/hr:	______	______	______
Pollutant mg/m3	______	______	______
Pollutant ppm wet	______	______	______
Pollutant ppm dry	______	______	______
Pollutant gr/dscf	______	______	______
Permit Limit:	______	______	______
Control Device Effic	______	______	______
Control Device acfm	______	______	______
Control Device scfm	______	______	______
Control Device dscfm	______	______	______

PRODUCTION DATA WORK SHEET
FOR THE PRESS
HOULTON, MAINE

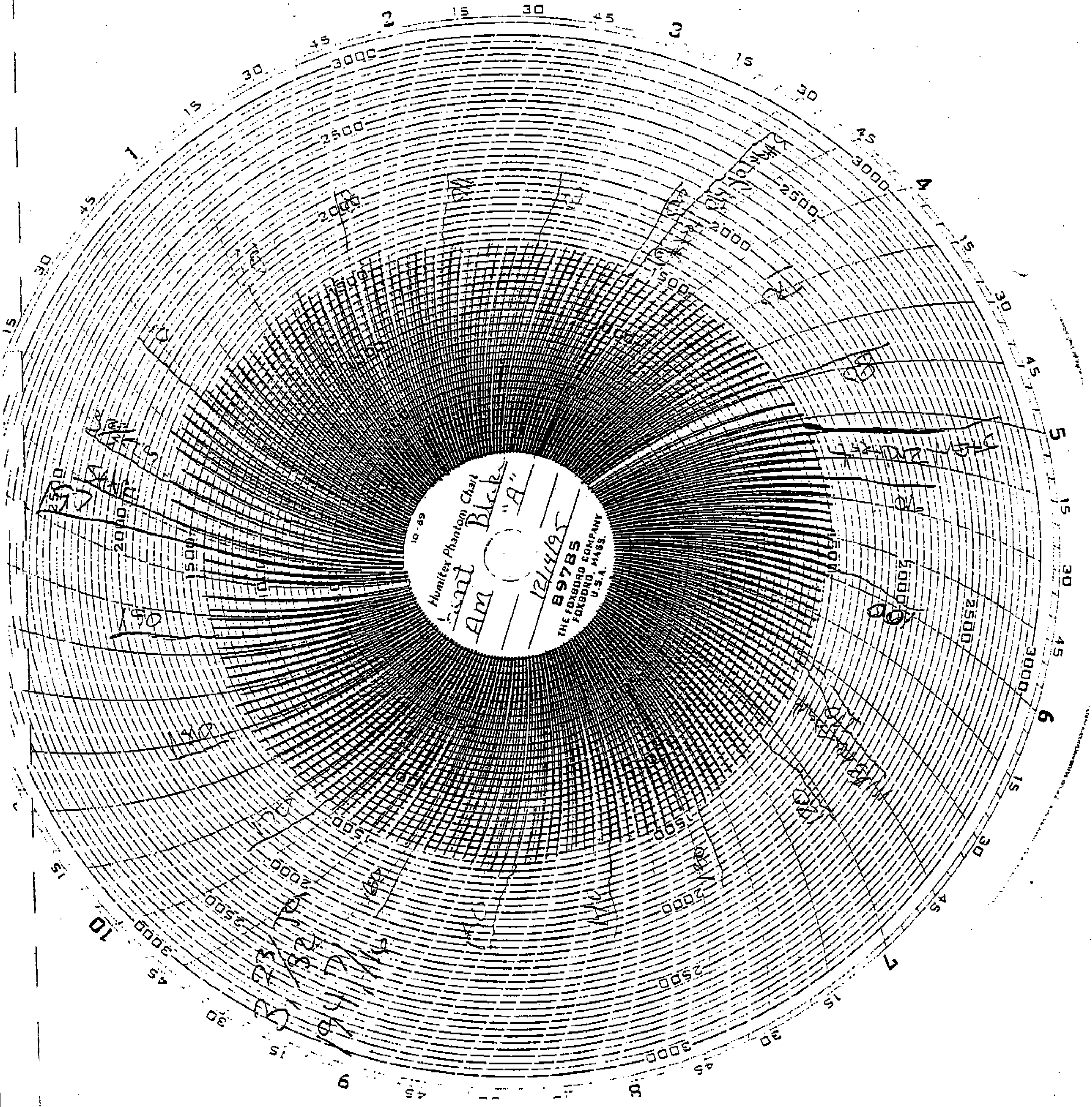
Prepared by: Mark Stile February 1, 1996

	Test 1	Test 2	Test 3
TIME Start/Stop:	1035/1135	1200/1300	1338/1438
Press Loads:	17.917	17.667	17.583
Total Wt Untrim (kg):	19,971.3	20,391.1	19,243.7
Total Wt Trimmed (kg):	18,437.5	18,825.1	17,765.8
Pressload Wt Untrim (kg):	1114.7	1154.2	1094.4
Pressload Wt Trimmed (kg):	1029.1	1065.5	1010.4
Board Wt Untrim (kg):	92.9	96.2	91.2
Board Wt Untrim (kg):	85.8	88.8	84.2
Produc.Untrimmed (tons):	22.02	22.48	21.22
Produc. Trimmed (tons):	20.33	20.75	19.59
Produc. Untrimmed (lbs):	44,036.7	44,962.4	42,432.4
Produc. Trimmed (lbs):	40,654.7	41,509.3	39,173.6
Production (sq ft):	27,520	27,136	27,008
Production (sq ft 3/8"):	23,588	23,259	23,149
Line speed (fpm):	61	61	61
Press time to position:	Not documented.	Overall timer: 148 sec	

Notes:

Trim Ratio: 7.68 %
Board weights are from scale conveyor printout.
Propane vapor volume figured at 8 psi
Resin Usage (worksheet) figures from flowmeter in batch mode.
Wax Usage (worksheet) figures from tank measurements.
RTO chart pen identification and ranges:

1) Combustion Temp. 0-1800 °F
2) Exhaust Temp. 0-500 °F
3) Inlet Temp. 0-500 °F
4) Bed Delta Press. 0-25"wc


Humitex Phantom Chart
10-69
89785
THE FOXBORO COMPANY
FOXBORO, MASS.
U.S.A.

LOUISIANA-PACIFIC CORP. PRESS REPORT

HOULTON, MAINE 97.714

OPERATOR K. Blake SHIFT (AM) PM CREW A DATE 12-14-94

LINE SPEED	FROM	TO	THICK-NESS	PRESS LOADS	PRESS TEMP	OVERALL TIMER	DECOMP. TIMER	REASON FOR LINESPEED CHANGE
38	700	715	23/32 TG	3	215	260	19.1	Start
61	715	330	7/16	140	215	148	13.1	
56	330	6:45	7/16	51	215	162	13.1	Dryer area struggling
45	645	7:00	7/16	3	215	195	13.1	Surface Dryer down

TOTALS 197 (3/8" FOOTAGE) = 356490

FLKR STROKES 1732 TDT 18 mins PEAB OIL BRNR: On -> DEBARKER DT 5:44 SANDER DT 1:32

KONUS #1 2741 KONUS #2 2538 SURFACE OIL BURNER On -> CORE OIL BURNER On ->

DOWNTIME FROM	DOWNTIME TO	M	E	O	QC	REASON FOR DOWN TIME
740	742			2		TOG NN
1143	11:47		4			TT #4 limit stuck on unloader
1150	11:52		2			change wand on limit.
632	642			10		Bungles
			6	12		

*** MAINTENANCE / LOCK-OUT LOG ***

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT
	3	23/32 TG	8832	
	194	7/16	347658	

LOUISIANA-PACIFIC CORP. PRESS REPORT
HOULTON, MAINE

OPERATOR K.P. SHIFT AM (PM) CREW D DATE 12/14/95

LINE SPEED	FROM	TO	THICKNESS	PRESS LOADS	PRESS TEMP	OVERALL TIMER	DECOMP. TIMER	REASON FOR LINESPEED CHANGE
45'	700	755	7/16	13	215°	210	19.1	Start
37'	755	643	23/16	113	215°	260	19.1	Scheduled
40'	643	647	7/16	1	215°	260	19.1	7/16 Changeover

TOTALS 127 (3/8" FOOTAGE) = 357767

FLKR STROKES 1591 TDT ~~36~~ 49 PEAB OIL BRNR: ○ DEBARKER DT 3:25 SANDER DT 12 hr.

KONUS #1 2289 KONUS #2 2908 SURFACE OIL BURNER ○ CORE OIL BURNER ○

DOWNTIME FROM	DOWNTIME TO	DOWNTIME(MINS) DEPARTMENTS M	E	O	QC	REASON FOR DOWN TIME
115	141			36		FCOS Baghouse Plugged.
647	700			13		Down

*** MAINTENANCE / LOCK-OUT LOG ***

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT
			14 7/16 - 25089	7:26 K.C. 45.5
			113 23/32 - 382678	8:27 K.C.
				24 5 14.1 47
				44.91

12/14/95
DATE

DAILY TONNAGE WORKSHEET Dec-95

BOARD SIZE	TONS / LOAD	DAY LOADS	DAY TONS	NIGHT LOADS	NIGHT TONS	TOTAL LOADS	TOTAL TONS
1/4	0.6763						
1/4 S1S	0.7787						
1/4 S2S	0.8192						
5/16	0.7980						
3/8	1.0086						
3/8 WEB	1.0191						
7/16	1.1141	194	216.1	14	15.6	208	231.7
7/16 S1S	1.1692						
15/32	1.2396						
1/2	1.2821						
19/32 SE	1.5009						
19/32 T&G	1.5366						
23/32 SE	1.7364						
23/32 T&G	1.7804	3	5.3	113	201.2	116	206.5
7/8 SE	2.1711						
7/8 T&G	2.1711						
1 SE	2.4345						
1 T&G	2.3514						
1.125 SE	2.5862						
1.125 T&G	2.7437						

TOTAL TONNAGE FOR THE DAY —>>> 438.2

1. LIST PRESSLOADS AND TONS PRODUCED.
2. ROUND OFF THE TONNAGE FIGURES TO ONE DECIMAL POINT. (i.e., 436.3454=436.3, & 438.4678=438.5, etc.)
3. LIMIT PRODUCTION NOT TO EXCEED 438.5 TONS / DAY.

M? LOUISIANA-PACIFIC
HOULTON, MAINE

SHIFT OPERATING REPORT

SUPERVISOR Mc Ninch SHIFT (AM) PM CREW A DATE 12-14-95

PRESS OPERATION:

THICKNESS	PRESSLOADS	3/8" FTG	DOWNTIME (Mins) M	E	O	QC
23/32	3	8872				
7/16	194	347658				
TOTAL	197	356490	—	6	12	—

YARD OPERATIONS:

FIRE DUMP CLEANED 5 TIMES
TRUCKS USED DIRECT ____ TRUCKS
BARK TRUCKS LOADED ____ TRAILERS
MISCELLANEOUS ____

KONUS FURNACE	HRS. FUEL USAGE WOOD	HRS. FUEL USAGE OIL
#1	12 Hours	0
#2	12 Hours	0

DRYER OPERATION:

	DRY FUEL USAGE LBS.	OIL FUEL USAGE HRS.	AVE. INLET TEMP	RUNNING TIME MINS.	DOWN TIME	AVG. WET MOISTURE	AVG. DRY MOISTURE	REASON FOR OIL USAGE
CORE	6,370	0	956	720	0	38.8%	5.1%	None Used
SURFACE	6,755	0	745	708	12	36.4%	9.5%	None Used

# OF UNITS	1/4	5/16	3/8	7/16	15/32	1/2	19/32	23/32 T&G	OTHER
A				104				3-25pcs	
A 1/2 UNITS									
U				2pcs					
E & X									

IF LESS THAN 99.5%, WHY?

MAINTENANCE/LOCK-OUT LOG

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT

PERSONNEL COMMENTS/CONCERNS:

ABSENT/TARDY	REASON	EXTRA PERSONNEL	REASON

LOUISIANA-PACIFIC
HOULTON, MAINE

SHIFT OPERATING REPORT

SM.C.

SUPERVISOR T. Tower SHIFT AM (PM) CREW D DATE 12/14/95

PRESS OPERATION:

THICKNESS	PRESSLOADS	3/8" FTG	DOWNTIME (Mins) M	E	O	QC
7/16	14	25089				
23/32	113	332678				
TOTAL	127	357767			36	

YARD OPERATIONS:

FIRE DUMP CLEANED 2 TIMES
TRUCKS USED DIRECT ____ TRUCKS
BARK TRUCKS LOADED ____ TRAILERS
MISCELLANEOUS ____

KONUS FURNACE	HRS. FUEL USAGE WOOD	HRS. FUEL USAGE OIL
#1	12 hrs.	0
#2	12 hrs.	0

DRYER OPERATION:

	DRY FUEL USAGE LBS.	OIL FUEL USAGE HRS.	AVE. INLET TEMP	RUNNING TIME MINS.	DOWN TIME	AVG. WET MOISTURE	AVG. DRY MOISTURE	REASON FOR OIL USAGE
CORE	1,570	0	1040	710	10	42.0%	4.8%	None used
SURFACE	7060	0	840	714	6	43.0%	9.0%	None used

# OF UNITS	1/4	5/16	3/8	7/16	15/32	1/2	19/32	23/32	OTHER
A				7 +28pcs				98 +50pcs	
A 1/2 UNITS									
U								5pcs	
E & X									

IF LESS THAN 99.5%, WHY?

MAINTENANCE/LOCK-OUT LOG

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT

PERSONNEL COMMENTS/CONCERNS:

ABSENT/TARDY	REASON	EXTRA PERSONNEL	REASON

RTO OPERATOR'S LOG #1

HOULTON, ME. Date: 12-14

Shift Electrician inspect the RTO outside and take the following readings every two hours. Press Lineman to fill in when Electrician is busy.

DataLiner:

Recovery Chamber Temperatures 1	2	3	4	5	Inlet Press. W.C.	Inlet Temp	Comb. Chamber Temp.	Exh. Temp.
317	304	304	342	311	4.1	97	1541	212
326	307	321	332	316	4.6	104	1542	218
332	313	318	350	310	4.8	109	1564	223
335	312	324	346	314	4.5	107	1555	219
332	309	326	341	313	4.5	105	1543	217
324	312	316	344	316	4.7	104	1541	220

...y Shift (at 12 AM): Propane tank #1 63 % Tank #2 55 %

... startup/shutdown times, problems, maintenance items, etc.:
...e chartrecorder time)

RTO OPERATOR'S LOG #2

HOULTON, ME. Date: 12-14

Shift Electrician inspect the RTO outside and take the following readings every FOUR hours. Press Lineman to fill in when Electrician is busy. Propane readings: 3 X per shift, Vaporizer: 1 X per shift.

RTO Delta P	Press. Inlet Duct	Burner Temperature #1	Burner Temperature #2	Burner Output % #1	Burner Output % #2	Motor Amps	Propane Pressures RTO	Propane Pressures Vaporizer In	Propane Pressures Vaporizer Out	Propane Temperature Vaporizer
17	5	1546	1560	6	1.7	123	7	40	8	136
17	5	1532	1538	5.2	41.2	118	[illegible]	[illegible]	[illegible]	[illegible]
17	5	1548	1539	29.7	40.1	115				
17	5.5	1548	1548	16.3	40.0	115	6.5	42	8	136
17	5	1555	1552	1.5	4.4	116				
17	5	1540	1549	21.0	6.5	113				

Burner Setpoints: 1) 1535 ETUE SYSTEM: ON ___ OFF ✓

2) 1535

adings taken by: DAY Richard Lyons

NITE Steve Tracy

TRIM RATIO

7/16 WEIGHTS   12 2 95

#1	~~9.[illegible]%~~	90.1 / 83.3	$\frac{90.1 - 83.3}{90.1} = 0.0755 = 7.55\%$
#2	~~[illegible]%~~	55.5 / 52.2	$= 0.0712$
#3	~~[illegible]%~~	5[illegible].4 / 53.2	
#4	~~[illegible]%~~	5[illegible].4 / 52.7	
#5	~~[illegible]%~~	5[illegible].9 / 5[illegible]	
#6	~~[illegible]%~~	[illegible] / 52.1	

$$\frac{495.1}{536.3} = 0.9231 \quad - \quad 0.0768 \text{ (AVERAGE)}$$

$= 7.68\%$

HOULTON DAILY PRODUCTION REPORT THU DEC 14 1995

SHIFT	TYPE	NO OF PRESS LOADS	NO OF PANELS	SURFACE FOOTAGE	3/8 in. FOOTAGE	SCHED RUN HOURS	NET RUN HOURS	% RUN TIME EFF	%PLANT CAP@ 240T/DAY	% of A GRADE	FLAKER STROKES	HOURS ON OIL	HOURS ON OIL
	1/4		0	0	0							KONUS 1:	0.00
CREW	5/16		0	0	0							KONUS 2:	0.00
	3/8		0	0	0							COREDRYER	0.00
A	7/16	194	9312	297984	347658							SURFDRYER:	0.00
	15/32		0	0	0								
	1/2		0	0	0								
AM	19/32		0	0	0								
	23/32 T&G	3	144	4608	8832								
	1 SE		0	0	0								
TOTAL		197	9456	302592	356490	12.00	11.71	97.60%	185.67	99.98	1732		
	1/4		0	0	0							KONUS 1:	0.00
CREW	5/16		0	0	0							KONUS 2:	0.00
	3/8		0	0	0							COREDRYER:	0.00
D	7/16	14	672	21504	25089							SURFDRYER:	0.00
	15/32		0	0	0								
PM	1/2		0	0	0								
	19/32 T&G		0	0	0								
	23/32 T&G	113	5424	173568	332678								
	1 SE		0	0	0								
TOTAL		127	6096	195072	357767	12.00	11.20	93.30%	186.34	99.89	1591		
DAILY TOTALS		324	15552	497664	714257	24.00	22.91	95.45%	186.00	99.93	3323		
WEEK TO DATE					3307978	120.00	111.98	93.32%	172.29	99.89	15208		
MONTH TO DATE					12843259	447.10	429.11	95.98%	179.54	99.73	56768		
				YTD=	244865153								

1/4=	143367
5/16=	0
3/8=	33792
7/16=	6732736
15/32	253440
1/2=	346103
19/32=	775792
23/32=	3906756
1=	651272

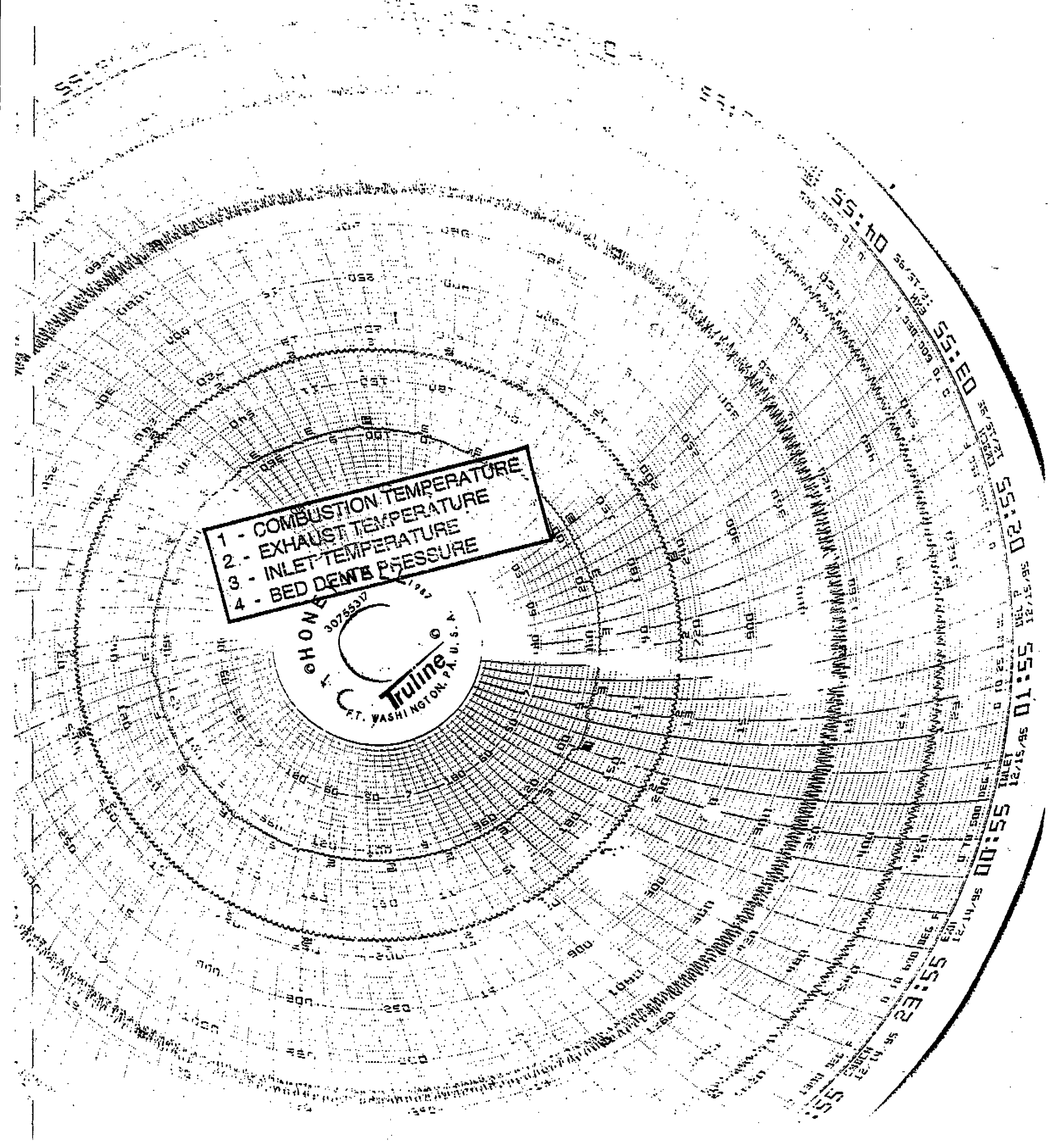
23500000 GOAL **
10656741 LEFT TO PRODUCE TO MEET GOAL**
761196 PROD. NEEDED/DAY *********
14.00 DAYS LEFT
380598 PROD.NEEDED/SHIFT*

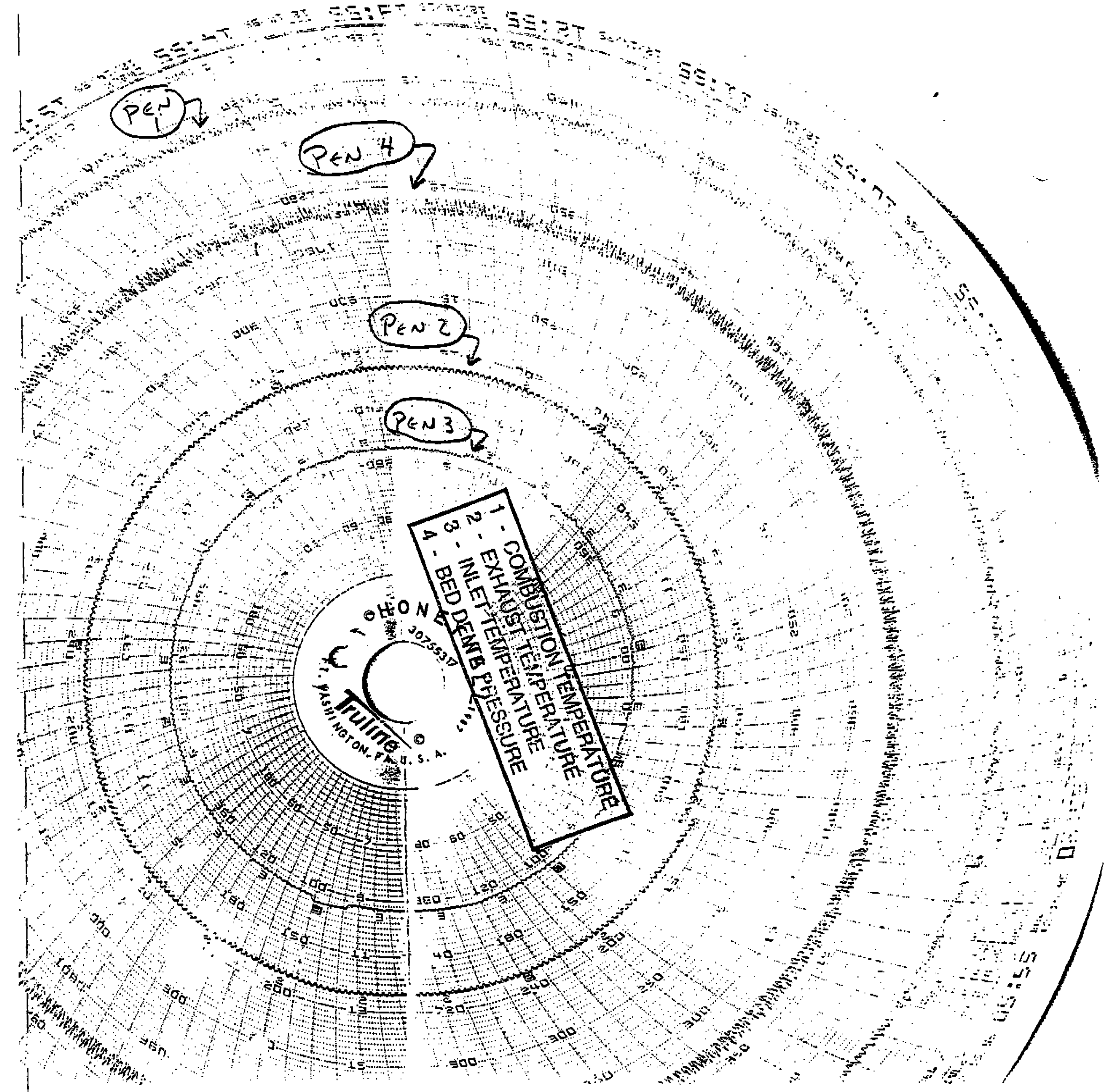
KONUS 1	0.40
KONUS 2	0.00
COREDRYER=	0.02
SURFDRYER=	0.00

MAJOR DOWNTIME:
MCNINCH:SCREENS JAMMED(10 M)
TOWER:FCOS BAGHOUSE PLUGGED(36 M)

MINUTES	MECH	ELECT	OPER	QUALITY
DAILY	0	6	61	0
WTD	248	149	65	27
MTD	361	254	265	228

FOREMAN	% RUN TIME EFF	% PLANT CAPACITY	% A GRADE	FLAKER STROKES	MTD PROD
MCNINCH	97.15%	187.30	99.93	15719	3572608
SCHOOLS	97.13%	184.26	99.85	14179	3152429
FITZ	96.95%	179.86	99.32	13253	3053092
TOWER	93.92%	175.13	99.79	13617	3130403


1 - COMBUSTION TEMPERATURE
2 - EXHAUST TEMPERATURE
3 - INLET TEMPERATURE
4 - BED DENS PRESSURE
Truline
FT. WASHINGTON, PA. U.S.A.
30755317
04:55
03:55
02:55
01:55
00:55
23:55
INLET
12/15/95
EXH
12/14/95


PEN 1
PEN 4
PEN 2
PEN 3
1 - COMBUSTION TEMPERATURE
2 - EXHAUST TEMPERATURE
3 - INLET TEMPERATURE
4 - BED DEMB PRESSURE
Truline
HONE
FT. WASHINGTON, PA. U. S. A.

ALAN JONES

By [redacted] Mark Chamberlain

Date By: 12-14-95

RTO TESTING readings every 10 minutes -

Fuel type_____________ Any meter conversion factors? _________

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet ONE of

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRES-SURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
9:40	325	307	307	347	307	4.7	1558	1559	165	1581	214	16	7917988
9:50	327	304	318	337	310	4.7	1554	1537	103	1535	247	16	
10:00	328	305	316	340	309	4.5	1549	1545	103	1533	215	17	
10:10	323	307	315	334	318	4.6	1537	1544	103	1531	219	17	
10:20	325	307	317	332	318	4.4	1536	1544	101	1545	218	17	
10:30	326	305	319	331	317	4.6	1531	1534	103	1543	218	17	70
10:35	323	309	311	339	316	4.8	1536	1537	103	1541	218	16	7918200
10:45	323	309	309	345	313	4.6	1525	1530	101	1531	218	17	
10:55	325	310	307	348	311	4.4	1530	1544	102	1542	218	16	
11:05	326	307	321	332	316	4.6	1532	1538	104	1542	218	18	
11:15	324	306	321	337	310	4.6	1538	1534	104	1541	215	18	
11:25	325	308	319	334	318	4.5	1538	1545	105	1549	219	16	
11:35	324	310	316	340	316	4.7	1538	1545	106	1547	220	16	7922650
11:45	325	310	319	339	317	4.5	1540	1545	106	1548	222	16	
11:56	326	313	312	351	311	4.2	1527	1538	107	1541	221	16	
12:00	327	310	322	337	319	4.5	1537	1545	105	1548	221	16	[illegible]23363
12:10	331	309	323	343	310	4.5	1543	1541	106	1545	218	18	
12:20	332	310	322	345	309	4.6	1548	1546	106	1553	218	17	
12:30	329	310	325	335	316	4.6	1530	1532	107	1538	220	17	
12:40	327	312	321	339	317	4.5	1536	1547	107	1549	223	16	
12:50	326	314	317	346	316	4.8	1540	1542	108	1547	221	16	

RTO TESTING readings every 10 minutes -

DATE 12-14-95

Fuel type______ Any meter conversion factors? ______

By: Mark Chamberlain - ALAN JONES

meter readings in Cu. ft. for nat. gas meter readings in gal. for propane

Sheet TWO °F

TIME	BED TEMPERATURES #1	#2	#3	#4	#5	INLET PRESSURE	BURNER TEMP. #1	#2	INLET TEMP	COMBUSTION CHAMBER TEMP	EXHAUST TEMP	PRESSURE DROP	GAS METER READING
1:00	330	314	316	354	309	4.6	1541	1550	108	1561	222	16	7925725
1:10	332	312	322	348	309	4.7	1554	1555	109	1565	219	17	
1:20	332	311	327	343	312	4.5	1544	1537	109	1547	220	16	
1:30	331	310	328	339	316	4.2	1531	1527	108	1535	221	16	
1:38	332	311	329	340	316	4.1	1532	1526	109	1535	221	16	7927233
1:48	329	312	327	339	319	4.4	1531	1535	111	1544	223	18	
1:58	328	314	322	344	319	4.5	1531	1545	109	1547	224	16	
2:08	332	316	317	350	315	4.8	1532	1532	109	1535	221	17	
2:18	327	316	318	350	316	4.9	1530	1530	109	1532	221	17	
2:28	333	312	326	347	318	4.2	1532	1536	109	1535	219	17	
2:38	333	312	330	341	315	4.3	1534	1527	108	1535	220	17	7929640
2:40	328	315	322	344	319	4.6	1541	1545	109	1549	224		

ENGINEERING

~~COMPLIANCE~~ TESTING
PRESS RTO

WAX & ~~RESIN~~ USAGE

BOARD THICKNESS 7/16 DATE 12-14-95

READINGS TAKEN BY Chip Cameron LINE SPEED ______

WAX ______ MDI ______ PF RESIN ______

TIME HOURLY	WAX DAY TANK LEVEL	SL WAX FLOW RATE IN GAL	MDI DAY TANK LEVEL	MDI FLOW RATE IN GAL	PF RESIN DAY TANK	PF RESIN FLOW IN GAL
Start 35 Am	34 1/2"					
35 Am	27 1/2 / 7" used	7" × 139#/in =	973#			
35 P.M	19 3/8" / 8 1/8" used refilled to 38"		1129#			
35 PM	31 1/4" / 6 3/4 used		938#			
35 P.M	22 1/2 / 8 3/4" used refilled to 33 1/2		1216#			
Testing complete						
		AVERAGE=	[redacted]			
			1064 AVERAGE			
total	30 5/8"					
	30.63					
	1562.13#					

POUNDS OF PF RESIN / HOUR: ______

POUNDS OF MDI / HOUR: ______

POUNDS OF WAX / HOUR: 1064 AVERAGE

ENGINEERING

RTO ~~COMPLIANCE~~ TEST

~~[illegible]~~ RESIN USAGE

page 1 of 1

DATE 12-14-95 READINGS BY K. Blake

BOARD THICKNESS 7/16 LINE SPEED 61'

SPECS: WAX ______ MDI ______ PF ______

	TIME	WAX	MDI		PF	
#1	Start 10:35		Rate 0.5020	146	Rate 1.657	481
	Finish 11:35		176	TOTAL used 30 GAL	575	TOTAL Used 94 GAL
				= 312 #		= 968.2 #
#2	Start 12:00		0.5070	190	1.603	615
	Finish 1:00		218	28 used GAL	708	90 used GAL
				= 291.2 #		= 927 #
#3	Start 1:38		0.5052	235	1.661	766
	Finish 2:38		266	31 GAL	860	94 GAL.
				= 322.4 #		= 968.2 #
			AVE 29.666 GAL			92.666 GAL.

1.5% Solids

POUNDS OF PF RESIN / HOUR: 954.5 AVG Phenolic-Total × 10.4 = pounds

POUNDS OF MDI / HOUR: 308.5 AVG MDI-Total × 10.3 = pounds

POUNDS OF WAX / HOUR: ______

Press Operator Notes

12/14/95

[signature]

ACRec

#1

Time		Load	temp	speed
start	1035	61	215	61
half	11:05	69	214	61
End	11:35	78	215	61

#2

start	12:00	84	213	61
half	12:30	93	215	61
End	1:00	101	215	61

#3

start	1:38	111	215	61
half	2:08	120	215	61
End	2:38	129	215	61